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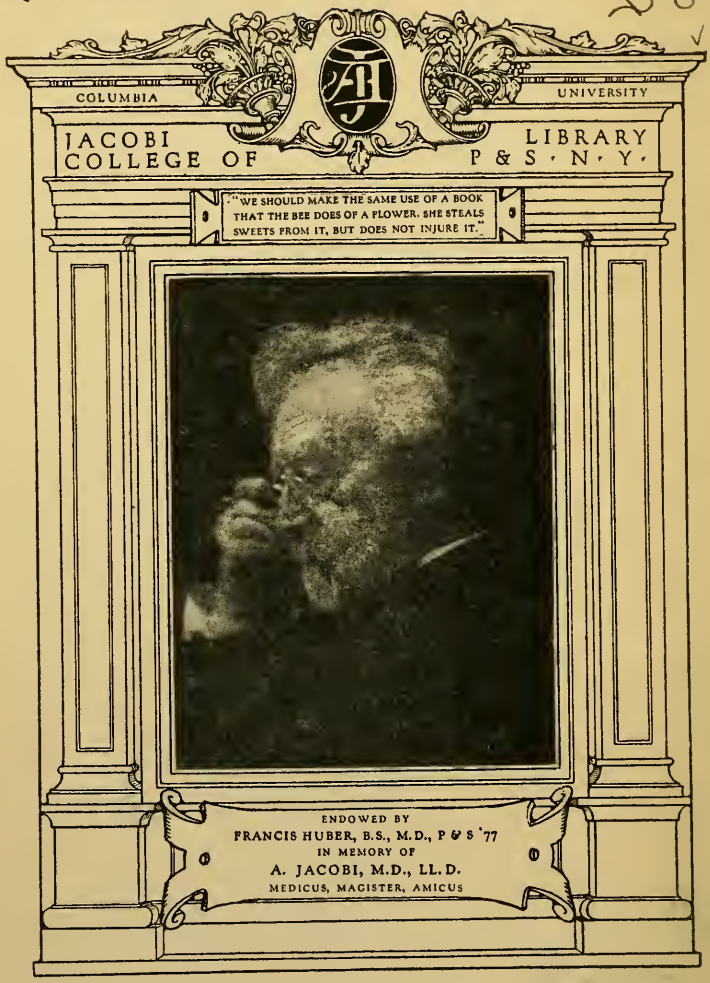
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CANCER

ITS

CAUSE AND TREATMENT

cV.1

BY

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To

THE GOVERNORS

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whose kind appreciation of and assistance to the author
in his clinical work in their institution have
done much to encourage him and to
promote the interest of the pro-
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PREFACE

Cancer has hitherto been regarded almost wholly from its histological and surgical aspects. The investigators and practitioners along these lines have been innumerable, the work done prodigious, and the literature relating thereto enormous. But relatively little attention has been paid to the medical aspects of this most threatening malady, although voices have been raised from time to time, with more or less force, all joining in the same plea that the basic cause of the disease lies in some derangement in the vital forces of the organism, as influenced largely by diet and mode of life.

It has, therefore, seemed to the writer that it was time to stop and look at cancer from a broader aspect, and by synthesis

and deduction to seek to understand some of the underlying causes of malignant disease; also to see if some general principles could not be ascertained upon which could be based an explanation of the views he had long held, and of the practice which he had long followed in regard to the prevention and cure of this dire malady. And as his studies progressed he was more and more satisfied that the true solution of the cancer problem lay along the lines indicated, although there was still very much to be learned regarding the details and application of the principles involved.

The lectures were prepared for and delivered to practicing physicians at the New York Skin and Cancer Hospital, in connection with the regular Wednesday lectures on Diseases of the Skin, as I felt that I should give them the benefit of what I felt to be of value in my own practice, private and public.

Although holding the views here ex-

pressed for many years I have hesitated writing strongly on the subject before, lest I should be misunderstood or misjudged: for favorable results based solely on a clinical diagnosis of cancer are always doubted. I have also feared lest by advocating a dietetic and medical consideration and treatment of cancer, which possibly might not be carried out exactly, I might really do harm; since some might be led to neglect operative measures in proper cases, at the proper time; and so in certain instances great injury and injustice might be done to the patient, and the time pass in which a surgical operation might possibly be of service.

But with my views and experience, strengthened greatly by what studies I have been able to make in the midst of a busy professional life, I now feel that I should do wrong in not presenting the results and conclusions of my study and observation. And I wish also to enter my

strong protest against the course which is usually followed in regard to cancer, both before and after operation. With a rather extended experience during the last forty years, I have rarely if ever found a patient with cancer who has received adequate and continuous medical care before operation, with a view of discovering and rectifying the cause of the morbid growth. Too often when a cancer is suspected or discovered it is taken as a foregone conclusion that the malady is hopeless, except as the *results of the disease,* that is the new growth, may be removed by the knife, X-ray, radium, caustics, etc. And after a surgical operation, as far as my observation goes, the patients are invariably left entirely to their own resources, with the hope, alas, too often futile, that the tumor will not regrow, but with no attempt to so guide the life that there shall not be the same tendency to a recurrent malignant new-

formation. Against this latter course I also raise my earnest protest.

In presenting matter from literature bearing on the subject under discussion I am well aware that I have hardly more than touched the surface of the deep ocean of recorded observations on cancer, but it was the best that I could do in my busy life. I only hope that others will take up in earnest the subjects here presented, and that this pioneer work may lead to the building of a strong and permanent structure regarding the true basic cause of cancer. Truth never fears proof.

In studying the subject I have been greatly assisted by the masterful work of Roger Williams, so often referred to and quoted from; and I feel that a candid and careful perusal of that book will be a revelation to many. I know that some have endeavored to throw discredit upon some of the deductions which he makes from

various statistics, but in the main they all teach a valuable lesson and are worth serious consideration, as they are taken from reliable sources.

Realizing fully that the problem of the cause and proper treatment of cancer is a most profound one, which master minds have long wrestled with and which cannot be fully settled without much further study, these lectures are presented to the profession at large in the hope that they may be the means of helping some one threatened with or suffering from malignant disease; and also that they may possibly stimulate others to investigate even more diligently along the lines of the medical aspects of cancer.

January, 1915.
531 Madison Avenue.

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CANCER
ITS
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LECTURE I

NATURE OF CANCER

It may be safely said that no disease which has afflicted mankind has received as much attention as Cancer, or concerning which there has been as much diligent search to find out its nature and cause. Tuberculosis, which seemed at one time to threaten even the existence of the race, has sunk into relative significance, as we have learned its true nature and conquered some of the causes of its ravages, and reduced its mortality very largely. Syphilis, under various names, forms, and aspects, was formerly much more of a menace than now,

and in earlier years caused veritable epidemics, but is now well understood and controlled. Leprosy is less of a terror than in earlier times, since it has been definitely shown not to be contagious. Smallpox no longer rages, and yellow fever, and the plague, and hook worm disease have been hunted down by scientific study and the application of proper sanitary and medical measures. And so on in regard to many of the ills which afflict mankind.

But cancer has held its own and has even increased in frequency, with rapid strides and bounds in some localities, until now it looms large as a national [1] or even universal scourge; it has been estimated to cause the death of half a million persons yearly among the civilized people of the

[1] According to the United States Mortality tables for 1912 there were 44,531 deaths from cancer that year, or 77 per 100,000 living, while the rate in 1911 was 74.3, an increase of 2.7. Tuberculosis has shown a steady decline, the death for 1912 being the lowest on record, 149.5 per 100,000, it having fallen from 200 per 100,000 in 1900, or over 25%.

earth, and untold misery and suffering to many times this number. And all this is still going on in spite of the earnest, faithful, and intelligent labors of innumerable research workers, the sacrifice of countless animal lives, and the expenditure of vast sums of money; and the end, as far as relates to its prevention and cure, seems almost as far away as ever, for many surgeons, in past and present times, have acknowledged their inability to cope with the disease.

Much, however, has already been established by scientific research, and still more earnest thought, observation, and endeavor should be given to seeking most diligently for the cause of the disease, in the laboratory as well as in practice; for there must be some cause of cancer, and also some reason for its steady increase.

But it is never to be forgotten that, as Pope says, "the proper study of mankind is man," and clinical observation, with

laboratory research, on cancer as it appears in the human being, must be the ultimate base upon which all true advance in the knowledge of the nature, treatment, and prevention of the malady can ever rest. To effect this we must study the human being in all relations of life, must know the constitution and class of subjects in which the disease is most apt to manifest itself, understand the chemico-physiologic actions going on in the system, before and during the existence of the disease, and by a process of synthesis and deduction understand what is wrong and endeavor to correct it.

All this is indeed a great undertaking, and can only be accomplished by great effort on the part of many careful and skilled observers. But I want, in these lectures, to give you an outline of my own thought and study for many years, and, if possible, to let you see as I do the lines along which investigation should be directed. It is hoped, therefore, that this and the follow-

ing lectures will throw some light on the connection of cancer with diet and mode of life, and some suggestions as to its prevention and cure.

Parasitism has been excluded: for while at different times many observers have reported various organisms which were thought to be the cause of malignant growths, none of these have been definitely confirmed by others, in spite of earnest endeavor; and all experimental and clinical evidence is against a parasitic etiology of cancer. It is therefore seen how improper it is to speak any longer of *"the germ of cancer,"* for, as is now widely acknowledged, there is no such germ, it is an *ignis fatuus* which has been chased in vain.

The *contagiousness* of cancer has also been excluded, certainly in the sense in which this term is applied to other affections. For while in some animals inoculation experiments have resulted in the transmission of certain tumors, little has

been determined except that such tumor material when transplanted can, in some unknown manner, multiply its cells indefinitely and form a focus of malignant disease, with disastrous effects on adjoining tissue. The same occurs in metastasis in cancer patients. But this does not at all explain the true basic nature of cancer, nor its development in those who have had no connection with other patients so afflicted. On the other hand the instances of suggested or supposed human transmission of cancer from one individual to another are so remarkably few, and so exceedingly doubtful, that a recent author, Janeway, states that "no well-authenticated cases of the transfer of a malignant tumor from one human being to another exist." It has been found impossible to inoculate human cancer into rats, mice, and apes, nor can animal tumors be inoculated into animals of a different species.

Heredity has been advanced as a cause,

but statistics fail to verify this in any degree whatever. While certain instances have been brought forward in which heredity seemed evident, the study of large numbers of those afflicted with cancer, in connection with others free from the disease, has shown almost the same proportion of antecedents with cancer in both classes of persons; although some recent evidence seems to show that there is some tendency in different families for different organs. Experimental studies have, it is true, seemed to demonstrate that tumors occur apparently along hereditary lines in some animals in regard to certain organs; but in these instances it is to be remembered that the animals were kept in captivity, and all fed alike, conditions which have been found to cause the development of malignant disease in wild animals when confined in Zoölogical Gardens.

In former years *malaria* was believed to have an influence in the production of can-

cer, and some investigators have thought to trace the prevalence of the disease to *telluric influences,* showing a preponderance of cases along certain water courses, or in certain streets or houses; but no definite proof of such connection has ever been established, and this theory is dismissed by the best authorities. *Syphilis,* in its latent effects, has also been claimed as an element in the causation of cancer, and undoubtedly the disease may develop, in suitable persons, upon old syphilitic lesions, especially about the mouth, anus, and genital region: but no one well informed in regard to cancer would regard syphilis as the real cause of the disease. All these and other etiological propositions are no longer considered to be tenable, and the very multiplicity of suggested causes shows that we are yet very far from the true etiology of cancer.

Age undoubtedly has a powerful influence in the development of cancer, the vast majority of cases occurring after the age

of forty or fifty. But, again, this does not at all explain the true nature of the disease, for only a certain proportion of elderly people are so afflicted, and malignant tumors have been observed in those of all ages, and even in young children. The degeneration of tissue belonging to advancing years undoubtedly renders it more susceptible to malignant disease, but this does not explain why one person is affected and not another, nor why the tissues in one locality or another take on this morbid action.

More recent scientific study has attempted to show that cancer originates from what are called "*embryonic rests,*" or pre-natal, wrongly placed, tissue elements, which at some time or other take on morbid action and develop into what we know as the various forms of cancer. Williams says, "From a biological standpoint tumor formation must be regarded as a phenomenon of the same order as reproduction in general: that is to say, as a spe-

cial form of overgrowth of the individual." But here again it is necessary to determine what causes them at certain times and in certain places to thus proliferate and form new tissue, which then becomes malignant and may proceed to destroy all contiguous tissues, and even to cause death.

Traumatism has been claimed by many as the cause which determines the activity of the misplaced cells, and starts them on their disastrous or rampant course: the various percentages of the cases in which it was believed that traumatism started up the malignant process has varied greatly with different observers, even up to 50 per cent. or more. But it is far from proven that this is always the case, nor does local injury in any way explain the persistency with which malignant disease, when once started, pursues its destructive and even fatal career; nor can traumatism account for the great tendency to recurrence constantly observed, either in the former site

or at some distant focus, through the agency of the lymphatic or vascular system. For of multitudinous traumatisms, even in cancer subjects, how few ever develop into malignant disease!

It would seem, therefore, that for the development of the local manifestation of cancer (the tumor or new growth) three elements are requisite, namely: 1. A predisposition or suitable blood condition. 2. A local stimulation or irritation of the part affected, *upon,* 3. The site of an "embryonic rest."

On the basis of the embryonic theory surgeons have of late most earnestly advocated the very early and complete removal of malignant lesions, including those of suspected malignancy, and even also the removal of many innocent lesions which are observed occasionally to lead to cancerous formation; and unless a better plan can be determined this cannot be urged too strongly in proper cases.

But while early operation has improved surgical statistics, it has not contributed to our real knowledge of the basic cause of cancer, nor has it taught us why those lesions or "embryonic rests" will remain quiescent for years, or prove harmless in some individuals, while in others they become most formidable agents of destruction. For it is now recognized that these wrongly placed tissue elements are very common anatomical or histological accidents, indeed it is claimed that they occur and exist in every individual: and the removal of isolated "embryonic rests" which have developed into cancer, does not by any means prevent the transformation of other similarly misplaced cells into malignant disease, as the frequent recurrence of cancer after operation demonstrates.

The same is true of the many and various forms of treatment other than surgical excision, such as deep acting caustics, and even the X-ray and radium, which like

surgery, only remove the focus of possible systemic infection, and do not affect the basic cause of the complaint: this latter is being shown more and more, by scientific investigation and observation, to be associated with metabolic or chemico-physiological changes in the system, and evidence is accumulating that it is dependent upon them.

All this leads thoughtful persons to inquire if there is not some deeper, fundamental cause lying back of the trouble, which should be reached and rectified by medical skill and acumen, something to do with the life or diet of a person which renders the tissues liable to take on malignant disease. So that a recent surgical writer on cancer states that "all study, whether clinical, pathological, or experimental, points to the fact that there is some underlying, hidden cause which leads to that aberration in the action of tissue cells which we call cancer," . . . a cause

"residing in only the cells themselves or in some abnormal chemical constitution of the plasma bathing the cells, or in both of these possibilities acting together."

Occupation has been questioned, but with most unsatisfactory results, for in some statistics which have been gathered cancer has been observed in those following all possible pursuits: and while laborers stood first on the list, clergymen stood fourth, while carters, threshers, and guides, who would be exposed to local injury, were at the bottom of a long list. It has been found, however, to be more frequent in trades or occupations in which the individual is most subject to the habitual abuse of alcoholics, as in bartenders, printers, etc.

We see, then, that thus far no satisfactory cause has been established for the occurrence of cancer, much less for the steady and great increase of the disease of late years. And as far as can be learned,

no measures are recognized, or at least generally adopted, to prevent its occurrence or recurrence; although, as already stated, modern surgery has seemed to improve the statistics in regard to its mortality in certain forms or locations, and the X-ray and radium have certainly also been able to remove, perhaps temporarily, some of the products of the disease.

We come then to the question, what is the real nature of cancer? Alas, all scientific, experimental, and clinical investigations have failed to solve the problem, except that all "evidence points to the conclusion that cancer is to be considered as a pathological disturbance of the normal cell life," from some unknown cause. A curious suggestion has been made by Schmidt, who found that of 241 cases of cancer of the chylopoietic system, 180 had never had any infectious disease of childhood, and 99 went through life without any infection of any kind; the figures point to

the existence of a cancer diathesis—one which is resistent to germs.

It would carry us too far from the practical side of our subject, even if we were at all able, to present or analyze the vast number of contributions which have been made to the pathological histology of cancer, and the changes which take place in the transformation of normal cells into those of malignant character: the amount of microscopic work which has been done along this line can hardly be imagined, and the literature relating to it is enormous.

Ewing, accepting the definition that the cancer process is "atypical and destructive proliferation of epithelium," quotes Ribert as saying that "no one has ever seen the beginnings of mammary cancer": but he does not bring us much nearer to the solution of the cancer problem than we were before. Bainbridge rejects all possibility of a blood condition, and finds the only solution of it in the early removal of every-

thing which is thought to lead to cancer, even the simplest benign new formations, but Ewing states that "in some cases carcinoma has developed after excision of wholly benign fibro-adenoma": and the immense number of cases of recurrent cancer after operations shows that we must look further than surgery if we wish to stay the progress of this formidable disease.

It would be useless to attempt to present the many theories which have been advanced relating to cellular metaplasia, or even to detail all the more or less accepted views in regard to the manner in which normal cells change and degenerate into those of malignant character: but some of the principal facts may be of service in understanding somewhat of the mode of development of malignant tissue from that which has been normal.

The statement of Virchow, "Omnis cellula e cellula," that is, "where a cell

arises there a cell must have previously existed, just as an animal can spring only from an animal and a plant from a plant," forms the basis of all study on the genesis of cancer and all tumor formation; karyokinesis, or indirect nuclear or cell division, is at the bottom of all growth, both normal and malignant, and the two classes of growth differ only in their methods and activity. In healthy tissues cell proliferation and destruction proceed in an orderly manner, forming homologous structures, as when the hair and nails are constantly produced from newly formed cells at the root, and the result of this new growth is removed mechanically when the hair and nails are cut from time to time, or the hairs fall out. In the case of the skin the epidermal layers are pushed forward and finally exfoliated as useless epithelial débris.

With the cells composing other, or internal structures, however, the process is different. For here each normal cell repro-

duces others of homologous structure, and the different parts of the system are thus kept in active service through anabolism, by means of which new cells are formed with renewed vitality, and the older, or effete cells are removed by catabolism; the elements of which they are composed are thus split up into their component parts, and carried off by the blood or lymph stream, and are then either discharged as effete substances or reutilized in the system, along physiological lines. Wakefield has pretty clearly shown that the developing cancer cell is the product of sub-catabolism, or a sub-oxygenation, induced by hyperacidity or oxidase deficiency in the surrounding medium of the blood plasma.

A great deal of thought, study, and speculation have been given in regard to the behavior of the cells themselves, and strong arguments are adduced for a local cell pathology, that is, regarding the cells as "autonomous beings, possessed of mor-

phological and physiological independence.'' But on the other hand we must recognize some restraining influence which continually causes the great mass of cells to reproduce those of homologous structure, in an orderly manner, and only very rarely some of them to break loose and form tumors, which may then become malignant and even destroy life. How this restraining influence is modified or withdrawn is, of course, a part of the problem of cancer. Those who maintain their autogenous character lay great stress upon the polarity of cells, and the relation of the centrosome to the nucleus, indicating a change in the polar axis in cells about to be cancer-genetic, as does Ewing in his recent classical study of pre-cancerous lesions. But whatever changes are observed microscopically we must recognize that the cells themselves must be influenced ultimately by that mysterious force which we call life, which ends with its extinction

from the body as a whole, and which is ultimately related to nerve action. We must also recognize that the cells everywhere depend for their life and activity upon the plasma in which they are bathed and from whence they draw their sustenance; and this plasma is renewed day by day from the food and drink taken.

Students of cancer are more and more recognizing and acknowledging that "all these phenomena, apparently so different, are merely protean manifestations of one common process which underlies and is the cause of them all, to wit, cell growth and proliferation. The particular outcome of the process in any given case is due to the influence of the conditions of nutrition—understanding by this term the whole of the material changes wrought in the organism through its relation with the surrounding world. This being so it is easy to understand how, under favorable conditions, certain cells may take on independ-

ent action, growing and multiplying without regard to the requirements of adjacent tissues and of the organism as a whole.''

There seems to be some reason to support the view advocated by Williams, that tumor formation and growth are but forms of agamogenesis, or non-sexual reproduction of cells, distinctly related to the decline in growth of the body in general. Hence while the forces of growth, development, and reproduction are in greatest activity the tendency to this disease is relatively small: but when growth declines and nutrition is relatively low the cells undergo gemmation, owing to perverted nutriment, and thus hyperplasia and not inflammation is the starting point of every neoplasm.

Experimental work has time and again demonstrated that cell growth, either good or bad, is modified in no uncertain way by the character of the nutrition furnished. Cancer has repeatedly been observed to disappear spontaneously, as such cases are

on record by careful and competent medical men: in certain of these instances it has occurred in connection with a radical change in the mode of life and diet, but in the majority of instances there is no record of the special cause of its disappearance. The lesson to be learned from this is that there are conditions of the system which are antagonistic to the abnormal proliferation of cell tissue, even when it has begun to take place, as we must believe that there are other conditions of the system which favor such diseased action of aberrant cells.

An interesting confirmation of this is attributed to Ehrlich, but I cannot find the original reference. He "has shown that mice living upon a rice diet cannot be inoculated with cancer, while mice living on a meat diet can be readily inoculated, cancerous tumors developing quickly and continuing to grow until the animal dies. Ehrlich also found that when mice with

cancerous tumors, the result of inoculation, were placed upon a rice diet, the tumors ceased to grow, and in many cases degenerated and disappeared.'' Valuable corroboration of this has been given by Sweet, Corson, White, and Saxon. They made a series of experiments in regard to the ''influence of certain diets upon the growth of experimental tumors,'' all with the same results. Of fifty white mice, 25 fed on glutenin and gliadin, and 25 on normal diet, 23 of the 25 on normal diet acquired tumors, against only 4 in the 25 on the glutenin and gliadin. This was repeated on 50 males, with the result of 18 in 25 against 3 in 25: and in a third series, of 50 females, the figures were 15 in 25 against 7 in 25. Thus, they found that 75 per cent. of 75 mice developed experimentally inoculated tumors when under normal diet, while only 19 per cent. of other 75 mice developed such tumors when under a diet of glutenin and gliadin, that is, vegetable proteins;

moreover, the tumors in the latter were in 30 days hardly larger than those in the former in 10 days. Rous has recently shown that large growths of certain transplanted rat and mouse tumors are checked in their development by underfeeding the host on a special diet.

The chemistry of cancer has been studied in most varied directions, and the literature relating thereto is very voluminous and can be hardly more than alluded to here. It is unfortunate, however, that most of the researches have been made in connection with patients who have advanced cancer, and very commonly with the disease affecting internal organs, which of itself interferes very greatly with their function, and so causes many of the perturbations of metabolism observed. What is needed are researches in regard to the metabolism of patients before the development of the disease, or in its earlier stages, before it has exerted its injurious effects

on the system, in order to learn of the causes which lead up to and induce the wrong action of the cellular elements, whose invasion and malignant action subsequently become so serious.

It is quite impossible in these lectures to enter at all fully upon the various biochemical studies which have been carried on in regard to cancer, but brief mention will be shortly made of some of the salient points. Not only has the structure of carcinomatous tissue been examined chemically, but the blood and urine have been submitted to most painstaking investigation, and metabolism in general has been studied in almost all possible directions, in the search for the cause of cancer; and yet, as Beebe says, "no phase of metabolism has been described in cancer which does not have a counterpart in non-cancerous conditions." But, as previously mentioned, all these observations and studies have been largely made upon advanced cancer

cases, when the system has already felt the unsettling and depressing effect of what is probably an injurious secretion from the deranged and actively proliferating cells of the cancerous mass. In a later lecture we will consider some of these matters in so far as they have relation to the dietetic and medical treatment of cancer.

The essence of our study thus far has been, that in every instance what is called malignant disease is but an aberrant action of originally normal body cells. That, as normal cells find their nutriment in the circulating plasma, so some pathological change in this latter causes them to take on abnormal action, and they no longer develop homologous cells, capable of forming normal tissue, but heterologous elements which have a natural tendency to disintegrate or break down, and exert a destructive influence on adjoining cells of any kind; and in this process they secrete a hormone which is prejudicial to the system

and tends to destroy life. In later lectures we shall endeavor to understand this more perfectly, and consider some of the elements in life which tend towards the production and arrest of cancer.

LECTURE II

FREQUENCY AND GEOGRAPHICAL DISTRIBUTION OF CANCER

Cancer in man exists all over the globe, but in different degrees of frequency, according to varying conditions of life, as we shall presently see. Malignant growths occur also in animals and fishes, though also with greatly varying frequency under different conditions; but there are few real tumors in reptiles or amphibians. Tumors are also occasionally found in vegetable organisms, presenting increased growth and proliferation of cells, arising from adventitious, or abnormally evolving buds, as also from parasitic and other external irritants. While these vegetable tumors are very interesting and in a measure instruc-

tive, in regard to the peculiarities of cell growth which they exhibit, they bear, of course, no relation to cancer in the animal kingdom, although some have endeavored to argue otherwise. There is, however, a certain suggestion of analogy to be found in the observation made by one writer, that "the origin of buds, as well as their subsequent development, is chiefly determined by the conditions of nutrition. Wherever there is an excess of nutritive material, capable of being utilized for growth by the cells of the part, there buds may arise"; we shall see later that the same thought applies to cancer in man and animals, when we come to the consideration of the relation of overindulgence along certain lines of eating and drinking to cancer.

Cancer has well been styled a disease of modern civilization, like tuberculosis, although of quite a different nature. Interesting studies have been made in regard to the increased death rate from the former

in England, coincident with a diminished mortality of the latter, in accordance with nutritional changes which have taken place in certain populations: and in the first lecture I mentioned that in the United States the mortality from tuberculosis had fallen 25 per cent. between 1900 and 1912 while, as we shall see later, the mortality from cancer has certainly risen.

Williams, who quotes very largely from the accurate statistics which have long been carefully recorded in England, says that "while tubercle has declined with great rapidity, cancer has increased at a still faster rate, and these inversely related changes are still in active progress. In illustration of these remarks it may be mentioned that during the last half of the nineteenth century, the cancer mortality for England tripled: while, during the same period the tubercle death rate declined to the extent of nearly one-half. Unless some great change in the national

habits takes place, of which there is at the present no well marked indication, cancer will ere long claim more victims than phthisis, as is already the case in many localities—e. g., Hampstead, Clifton, Bath, etc.'' He further says, ''I regard this decline in the presence of tuberculous diseases as the direct outcome of the better food and improved hygienic conditions, for which we are indebted to our increased national prosperity: and I shall endeavor to show that conditions of this kind, by their action in another direction, are also mainly responsible for the augmented cancer mortality.'' We shall see later that cancer has asserted itself where modern civilization has augmented the opportunities of over-indulgence along many lines of eating and drinking: for while advancing scientific knowledge has undoubtedly diminished mortality in general, and has added to the average length of life, the various factors included in our modern mode of living have

also with certainty increased morbidity along such lines as neurotic and vascular disorders, tumors, etc.

All statistics from various localities show that cancer has certainly increased in frequency very greatly of late years, and though some have attempted to claim that this increase is only apparent, and is due to greater accuracy of diagnosis, and the prolonging of more lives to an age when cancer is more common, there is no doubt in the minds of those who have studied the figures that the increase is certainly very real; and unless there be found some way to check its production, the death rate at the end of the century will be appalling.

It is quite impossible here even to give a comprehensive idea of the immense amount of work which has been given to the study of the statistics of cancer in various parts of the world, as collected in the remarkable works of Roger Williams and Jacob Wolff, but brief mention must be

made of some of the items observed and recorded in order to properly understand our subject. Williams in particular has analyzed the recorded facts in an interesting and convincing manner, and shown again and again in connection with the figures from different countries, sections, and cities, that the occurrence of cancer bears a striking relation to the condition of the people in reference to their material prosperity; namely, that the well-to-do, who can overindulge in many ways are vastly more subject to cancer than those in the poorer walks of life; also that aborigines in the wilder parts of the world are either almost exempt from cancer, or suffer from it to a very much less degree than civilized foreigners who come to their lands. This is also shown in a very striking manner by Wolff, and I present here a table which he gives in regard to the progress of cancer in a single country, Australia, among the native born and foreigners.

OF 100,000 LIVING THERE DIE OF CANCER IN AUSTRALIA

Year	*Number of Inhabitants*	*Native Born*	*English*	*Other Nationalities*
1851	403,889		28	14
1861	1,153,973	5.6	30.5	19
1871	1,168,377	9.7	56.7	25
1881	2,252,167	16.8	72.9	32.6
1891	3,183,237	19.8	119.8	45.9
1901	3,771,715	22.6	203.1	57.3

He remarks, "We see from this comparison in what a great degree the death rate from cancer has increased in foreigners as compared to the native born, in whom the disease has remained about stationary, when the increase in population is considered." Another writer remarks that when native Australians mingle with foreigners as servants or employés, and adopt their diet and customs, cancer occurs more frequently in them. Much the same has been reported in regard to other peoples and nationalities, and later we will consider the influences of urban life on the production of cancer.

In New Zealand, according to Hislop and Fenwick, where the general death rate is the lowest in the world, cancer is on the increase, as civilization advances. In the great majority of cases the alimentary canal is the seat of invasion, even in women: all the patients studied were hearty eaters, taking also very much strong tea many times daily.

The Polynesians and Melanesians seem to be peculiarly exempt from cancer. Sir William McGregor, although he had operated several times on whites in the Fiji Islands, never remembers operating on a Polynesian or Melanesian, who are practically vegetarians. He never saw a case in British Guinea in 9½ years, and then saw an encephaloid cancer of the tibia in a Papuan, who for 7 or 8 years had lived practically a European life, eating canned Australian meat daily.

In regard to Africa, Williams quotes Dr. Madden of Cairo, who says, "The con-

sensus of opinion among medical men in Egypt is, that cancer is never found, either in male or female, among the black races of that country. These include the Berberines and the Sudanese, who are all Mussulmans, and live almost entirely upon vegetable diet." Of 19,529 deaths among natives of Cairo during 1891, only 19 were due to cancer (females 10, males 9) or 1 in 1028. In England during the same year the proportion of cancer deaths to total deaths was 1 in 29. In the Islands of Lagos, on the West Coast of Africa, Dr. Johnson, in 14 years' practice there saw 5 cases of cancer in natives all of whom lived as Europeans. In southern Africa, "among the Boers and Europeans, who are large flesh eaters, malignant tumors are common: but among the natives, who are mainly vegetarians, these tumors are so rare as to be almost unknown."

Renner reports interestingly in regard to cancer among the descendants of liber-

ated Africans or Creoles, in Sierra Leone, Africa. During 30 years, from 1870 to 1900, there were but 20 cases recorded as malignant disease among 22,453 admitted to the Colonial Hospital: in the next ten years there were 26 among a total of 10,163, a slow but steady gain in cancer incidence, with the advancing influence of the white man. He says that while the aborigines eat no meat, the "Creoles" eat much meat; the teeth of the latter are beginning to decay, like those of the whites, which is attributed to the sweets introduced by the latter. Every case of cancer recorded has been in a Creole, living like a European, and not a single case among the aborigines.

Much the same freedom from cancer has been noted in regard to negroes when first brought to the United States in slavery, when their food and mode of life was simple: but since emancipation and in proportion as they have mingled with whites and eaten their food, with their own natural

tendency to gluttony and laziness, cancer has increased among them, although their death rate from malignant disease is still much less than that of whites.

In India all writers agree that cancer is rare among the inhabitants of warmer country districts, where they live largely on rice or millet, with a little milk and butter, and vegetables: they eat meat rarely, the immense majority of the people live a rural life, depending upon agriculture for their sustenance.

Investigations of late years, however, might seem to indicate that cancer is more prevalent in India than previously supposed, but its incidence still bears no real relation to that in many other countries, and an analysis of some recent reports explains in an interesting and curious manner the reasons for the diversity of opinion as to the actual frequency of the disease.

Thus, Benratt collected a total of 1700 cases only from 5 years' statistics of 15

Mission Hospitals and 34 Government Hospitals, representing, of course, many million inhabitants, whereas in New York City, according to the weekly Bulletin of the Board of Health, there were 2193 deaths from cancer in the last six months, a striking illustration of the rarity of cancer in India. Moreover of these 1700 cases, over 1200 were about the mouth, a very large share of these arising from the very common habit of chewing betel, which contains also much calcium, which latter is one of the salts incriminated in the causation of cancer. Sandwith attempts to show that cancer is prevalent in India, but refers to only 2000 cases reported in the hospitals there, in three years, also among many millions of people, and he refers likewise to the betel chewing cancer, and the "kangri burn" on the abdomen of men, from the charcoal furnace worn for warmth: these peculiar local disorders viti-

ate any deductions which could be drawn from such statistics.

In China, according to a recent writer, "cancer is comparatively uncommon in those parts where the bulk of the people live on an almost exclusively vegetarian diet, being too poor to purchase any of the various flesh foods, which are there used for culinary purposes. But in places where cancer is said to be more prevalent, the reporter adds, "All Chinamen there eat fish and pork at morning and evening meals: fowls and ducks are always on the table of all but the most humble of the coolie class."

In regard to the occurrence of cancer in the Far East, however, some of the modern investigators, such as Bashford, have endeavored to overturn the generally accepted view as to its infrequency, but I do not feel that the evidence presented can at all weigh against the unprejudiced opinion

of most capable medical men who have long lived and practiced in those regions, some of whom as medical missionaries have had most intimate contact and acquaintance with the natives. Only very recently a medical missionary, who has long been connected with the medical college and hospital in Beirut, Syria, told me that cancer was practically unknown among the thousands of patients who flock there from all over the Near East, he adding that they were all largely vegetarians.

During a rather extensive trip through the Far East I was unable to see or even hear of any cancer, although I met a large number of medical men, and made diligent inquiry regarding the same. As I wished to verify my views in regard to the rarity of the occurrence of cancer among those who lived on rice or other vegetarian diet, I visited very many civil, military, and mission hospitals, with a total of many thousands of patients, and ministering to

many millions of population; in Japan, Korea, China, the Philippines, India, Siam, and Egypt, I met the same response, that cancer was rarely seen among those vegetarian natives.

Brazil is credited with having the lowest cancer record of any portion of the western hemisphere, especially among the natives in the Equatorial regions, while in the Argentine Republic, where meat is known to be largely consumed, cancer is fairly common. From many parts of the world there come reports of the relative infrequency or even absence of cancer among simple living natives, one writer in regard to the West Indies stating "Even those cases which I have witnessed in this class of people have been among the better orders of them, whose habits of living assimilated to those of Europeans."

England and Wales present the most satisfactory field for the study of the progress of cancer, as the national vital statis-

tics have been well kept since 1840; even at that time under the able direction of William Farr they had already acquired a well-deserved reputation for reliability, as Williams remarks, from whom I shall freely quote.

In that year, 1840, there died of malignant disease in England and Wales 1 in 5,646 of the total population, 1 in 129 of the total mortality, or 117 per million living. In 1905, the deaths, due to this cause were 1 in 1,131 of the total population, 1 in 17 of the total mortality, or 885 per million living: thus, while the population had only a little more than doubled, the cancer death rate per million living had increased five fold. Dr. Williams answers by figures and tables the several objections which have been raised in regard to the actual increased mortality from cancer, as it has been repeatedly claimed that the increase is only apparent and not real; thus it has been asserted that it is due—1. To mere

increase of population: 2. To the average age of the population having advanced: and 3. To improved diagnosis and more careful death certification. Time does not admit a full presentation of his statistical refutation of these claims, to which he devotes some pages very convincingly, but it can be safely accepted that for some as yet unknown reason, cancer has made strides in England which are truly alarming.

Williams has also made some most interesting studies in regard to the increase of cancer in connection with changed conditions of life, and from his analysis of statistics, he very clearly shows that the spread of the disease has closely followed urbanization, and the rapid increase in material prosperity of recent years: in England where 80 per cent. of the population are now town dwellers, this tendency to collect in cities and towns has gone farther than in any other community. He recognizes that any far-reaching, environmental

change of some duration is probably potent in disturbing the stability of the constituents of living bodies, and the sudden change from poverty to riches and plenty is conducive to the development of cancer: allusion has already been made to the inverse relation of deaths from cancer and tuberculosis, the latter diminishing with improved material conditions, while the former increases as wealth and indolence increase.

He shows this by statistics from various localities, and by data from towns in different countries he makes it pretty clear that "Cancer mortality is lowest where the conditions of life are hardest, the surroundings the most squalid, the density of population greatest, where the tubercle mortality is highest, the general and infantile mortality greatest, and where sanitation is least perfect—in short, among the poor of the industrial class in our great towns: whereas among the wealthy and well-to-do, where the standard of health is at its best and life

is easiest, and where all the conditions of life are just the reverse of the foregoing, there the cancer mortality is highest."

While this is a pretty strong statement and many exceptions could undoubtedly be found, careful investigation will show it to be true in the main; for it must be remembered that even among the poorer classes gluttony, especially in regard to proteids, is not at all uncommon, and indolence, with impeded metabolism, is not at all unusual. Dr. Latham found that the mortality from cancer in England, from 1881–1890, was more than twice as great among well-to-do men having no specific occupation, as among occupied males in general, the respective mortality ratios being 96 for the former and only 44 for the latter. Sir William Banks confirms the steady increase in cancer very strongly, which he attributes to richer and more abundant food, of which males eat more than females, and consequently cancer is increasing proportion-

ately more among men, as all statistics show.

Switzerland is reported to have the highest death rate from cancer of any country, it having augmented from 114 per 100,000 living in 1889, to 132 in 1898. There again the cancer mortality varies greatly in the different sections or cantons: thus, in wealthy Lucerne it is 204 per 100,000 living, and only 36 in poverty stricken Valais. In the city of Geneva it is 177 per 100,000 living.

Denmark, next to Switzerland, is reputed to have the highest cancer death rate of any country in Europe, viz.: 130 per 100,000 living in 1900. But here the statistics are only from the towns, which comprise but a quarter of the whole population: the per capita wealth is said to be higher there than any other country in Europe except France.

France shows a high cancer mortality, with a constantly increasing death rate;

and, next to England, France is the richest country in Europe, and wealth is much more widely diffused: the French workers own nearly 8 times, per capita, more than those in England. In Paris the cancer death rate has increased as follows, for each 100,000 living, in 1865, 84; in 1870, 91; in 1880, 94; in 1890, 108; in 1900, 120.

Italy, a comparatively poor country, shows a low cancer mortality, but even here it is increasing from 20 per 100,000 living in 1880, to 52 in 1899, and 58 in 1905. The consumption of meat is there the smallest in any European nation, namely 23 pounds per capita in 1895. In the chief towns the rate of death from cancer is high: thus for each 100,000 living, in Florence 137, Ravenna 120, Venice 103, Milan 101, and Rome 77.

Time does not permit a wider survey of the field of distribution of cancer, as presented so remarkably from official statistics by Williams, and Wolff; but in con-

nection with the high percentages of deaths above quoted among the richer classes it may be interesting to mention some of the lowest records. Thus, in the poor country of Kerry, Ireland, it was 27 per 100,000 living, in the province of Dalmaltia 19, in the Shetland Islands 16, in Servia 8 (from 1895 to 1904), and in Ceylon in 1903 the mortality from cancer was about 6 for each 100,000 living.

The United States, unfortunately, has not kept the vital statistics of the country in years past with anything like the fullness and accuracy which has obtained in England, nor even at the present time is it possible to learn definitely the frequency and increase of cancer in every locality. But all the statistics which have been gathered show unequivocally that the disease has steadily increased in a manner which is alarming. Analyzing the recorded deaths from cancer in thirty-one cities, and the percentage of increase in four years,

one writer estimates that, if the same increase is continued, by the end of the century there will be a death rate, approximately, of 1000 in every 100,000 inhabitants, or one in every hundred.

In a recent Bulletin of the Board of Health of New York City the following statements are made in regard to the mortality from cancer in 1913: "The statistics of our seven largest cities recently tabulated, show that the cancer death rate was the highest on record. For New York City the rate was 82 per 100,000 of the population, against an average of 79, for the last five years: for Boston 118 against an average of 110: for Pittsburg 79, against an average of 70: for Baltimore 105, against an average of 94: for Chicago 86, against an average of 81: for Philadelphia 95, against an average of 88: for St. Louis 95, against an average of 85." This average increase of almost 8 per cent. of deaths from cancer in the combined population of

these seven cities, during the last five years is certainly an alarming fact, and cannot be explained on the ground of greater accuracy of diagnosis: for it is not to be presumed that there has been such great improvement along diagnostic lines during the single year 1913.

It is difficult to state the exact prevalence of cancer in the entire United States, as the "registration areas" include only about two-thirds of the total population: much can be learned, however, from the annual volumes published since 1900. According to these Mortality Statistics of the United States, the deaths from cancer and other malignant tumors per 100,000 population were as follows: in 1900, 63, in 1904, 70.2, in 1909, 73.8; and in 1912 there were 46,531 deaths from cancer, or 77 per 100,000 population, an increase in the death rate from this disease of almost 25 per cent. since 1900; while, as before stated the

tuberculosis mortality had fallen a little over 25 per cent. in the same period.

As in other countries, which might also be expected from the statements already made, the disease varies in frequency in different localities and communities. Thus, cancer is stated to be much more prevalent in the northern than in the southern states, and as already stated, the negroes are much less subject to the disease than whites, especially when they are living their own natural home life; but when they come to the cities, as waiters, etc., in hotels, their cancer death rate increases. But even in New York City in 1912 the deaths from cancer in negroes was 1 in 32.2 total deaths, against 1 in 17.7 in whites; the mass of negroes here, of course, live plainly and work hard. The North American Indians also are believed to be almost exempt from cancer in their primitive savage condition, but as they have come under the

influence of civilization they are more affected. It has also been noted by several observers that immigrants and their descendants present a very much higher mortality from malignant diseases than prevails in their native countries; from these and other considerations Williams suggests that abrupt change of environment may also be a factor in the causation of this disease.

We have thus seen while cancer is very widely distributed over the globe it is present in varying degrees of severity in different localities, and careful analysis shows that the disease affects different classes of persons with unlike severity. All these statistical studies and observations serve to confirm the statement made earlier that cancer is a disease of so-called civilization, and that it has increased in proportion as human beings have come under the influence of wealth, and consequent luxury and overindulgence, with bodily inactivity; all

these elements lead to a disturbed metabolism, which as we shall see later, is, at least, a contributing cause to the deviation from normal of some of the cellular elements of the body. It also appears that some of these metabolic shortcomings have to do with a disturbed nitrogenous balance, which is due to the constantly increased consumption of meat. In 1909 the meat consumption in the United States had reached the high figure of 172 pounds per capita, as I learned recently from Washington, a far greater amount than in England, 130 pounds, as already stated; and with this steady increase in the use of nitrogenous food cancer has also increased by leaps and bounds in both countries.

LECTURE III

METABOLISM OF CANCER

In the first lecture we saw that cancer was an alteration of the normal cells of the body, whereby they take on a malignant action and continue to do so, destroying contiguous tissues and leading to a lowered vitality, with an apparent poisoning of the system, which finally causes death. As the cells of various organs furnish different secretions, which in health contribute to proper metabolism, resulting in growth or maintenance of the tissues, so these disordered cells are believed to secrete a toxic substance, or malignant hormone, which has a prejudicial action on the body, and hæmolytic action on the blood, as has been brought out pretty clearly by Troisier and others.

We saw that as yet the definite cause had not been determined, why at some period certain cells take on the action which we call cancer, nor why they persist in their destructive course. Long continued and abundant laboratory and clinical research have about decided certain questions negatively in regard to its etiology, so that in a measure the field is cleared for the study of some of the possible basic causes of the disease in question. Thus, all are pretty well agreed that cancer is *not* contagious or infectious, that it is *not* caused by a micro-organism or parasite, that it is *not* wholly due to local injury, that it does *not* appertain to any particular occupation, that it is *not* hereditary to any great degree, that it does *not* especially belong to or affect any particular sex, race or class of persons, *nor* is it confined to any location or section of the earth, and that it is *not* wholly a disease of older age.

We saw further that there appeared to

be good evidence that certain misplaced "embryonal rests" were the original starting points of diseased cell action, but as these are now known to exist in every one from birth, this offers no real explanation of the occurrence of the disease at different times in life. It is, of course, quite possible that local injury of one kind or another may be the exciting cause which determines that a cell or group of cells shall revert to its original reproductive activity, as Williams contends that the process is one of agamogenesis, dependent upon excessive and faulty nutrition. The question as to the relation of uricacidæmia, or lithæmia, to cancer has never been fully studied, and it is worth considering whether, as in gout and rheumatism, to which cancer is often associated and perhaps closely allied, the exciting cause may not be the lodgment somewhere of uratic deposit, which is further excited and fed

by effete or imperfectly oxidized nitrogenous elements; for later we shall see that perverted metabolism, largely of proteid elements, is closely associated with cancer.

We noted also that some attributed cancer to independent cell action, relating to the polarity of cells, etc.; but it is inconceivable that a cell or cells can idiopathically start out on a rampant course and pursue it with increasing severity, even until death results, without, at least, some definite pre-disposing cause, even though diligent and earnest work has not as yet determined just what that cause may be. The error has been, we believe, in searching too exclusively by the microscope and by certain laboratory methods, and not sufficiently along clinical and bio-chemical lines. For it must be recognized that all the cells of the body are continually bathed in the vitalizing fluid of the blood, whence they derive their nutriment, and into

which, with the lymphatics, they return the products of their vital action, by anabolism and catabolism.

By exclusion, therefore, we are reduced to seek the etiology of cancer along other lines, and about all that is left is metabolism, as influenced by advancing, so-called civilization, which relates very largely to diet and mode of life. This we will take up later, but will first examine some of the scientific findings in regard to the blood in cancer, and data relating to the various secretions and excretions of the body bearing upon metabolism in this disease.

That the blood shows great changes in advanced cancer is recognized by all, as is clinically manifested by the intense cachexia and anæmia commonly present and always strongly marked toward the end, of which the cytology has been very fully studied and presented by Türk. When then examined there is found to be a marked reduction of red cells, low hæmo-

globin index, and distinct leucocytosis, with greatly diminished alkalescence.

The reported changes in the blood have also varied with the location of the malignant disease, according as it may interfere mechanically or otherwise with the function of certain organs, which fact naturally obscures the question of the true relationship of the blood to cancer. Thus, it is stated that in cancer of the liver and pancreas there is always leucocytosis and glycogen, and that "cancer appears to interfere greatly with the function of the liver as a destroyer of intestinal toxins, they pass into the general circulation, probably cause the glycogen reaction, and at least part of the leucocytosis, and very often give rise to fever." There are also other microscopical alterations in the blood in late cancer. Thus, degenerative change in the leucocytes are common, with derangement in the normal proportion of their different forms, as also changes in the ery-

throcytes, with nucleated red cells and megalocytes in severest cases.

Price Jones in a study of the blood in 30 cases of cancer (9 of the breast) found the red blood cells diminished on an average of 6 per cent., the white blood cells increased 38 per cent., lymphcocytes increased by 10 per cent., large mononuclear cells increased 164 per cent. and polynuclears 42 per cent. Burnham states that in the severe grades of anæmia with malignant disease, poikilocytosis is marked, and nucleated cells of both normoblastic and megaloblastic type may be present. The red corpuscles may be reduced to 2,500,000, and exceptionally to 1,000,000. Cohnreich in a very technical study of blood from cancer subjects, observed very great increase in the resisting power of the red blood cells to osmotic tension, that is, in regard to their hæmoglobin, which he believed to be of diagnostic value in doubtful cases.

Unfortunately, there have been relatively

few studies of the plasma of the blood in this or other diseases; and yet the condition of this fluid must be of the utmost importance, as from it are derived the nutrient principles not only of the solid constituents of the blood, but also those of the entire system, about 8 per cent. of it being serum albumen and serum globulin. It also holds in solution the phosphates, carbonates, sulphates, and chlorides, the latter often varying greatly, and being chiefly responsible for the isotonic relation of cells and serum. In cancerous cachexia a diminution of carbonic acid, a constantly diminished alkalinity, and an increase of acid principles of the blood have been fully demonstrated, pointing in all probability to the existence of an acid intoxication. The formation of the corpuscular elements of the blood must be greatly interfered with when metastases occur in the blood making organs, the lymphatic tissue, bone, marrow, and spleen, which probably occur

more frequently than is generally recognized. It seems that the toxic secretion from a cancerous mass has a distinct action upon the blood, for after complete removal there is often observed an increase of hæmoglobin, as I have witnessed, and a high leucocytosis has disappeared after the removal of schirrus of the breast, only to return again with the recurrence of the tumor. Abderhalden states that in from two to three weeks after the operative removal of cancer, certain defensive ferments can no longer be found in the serum.

Many laboratory studies have been made upon the chemistry of cancer tissue, seeking to determine the nature of the toxin produced, and its experimental effect on animals, but thus far no great results have been obtained. It has been observed, however, by Gruner that when cancer juice is injected intra-venously a marked lymphocytosis arises, which is followed by the appearance of large mast cell myelocytes in

the blood. This cancer juice is supposed to be autotoxic in cancer patients, and to comprise toxic albuminoids, which being in quantities too great to be quickly neutralized poison the system, especially the blood and the hæmatopoietic organs.

In regard to the real bio-chemistry of cancer, we are still greatly in the dark. Vast numbers of studies and researches have been made to determine the real character and nature of the bio-chemical changes which occur in cancerous tissue, and the mere recounting of the reported findings and theories elaborated from them would occupy far more time than can be profitably given in these lectures. Some have claimed very positive findings which account in a measure, at least, for the pathological conditions, while others, as Beebe, state that "the chemical study of tumors is in its infancy. We have scarcely proceeded far enough to know where the medical problems are, nor have methods

now available been perfected to such an extent as to enable a decisive experiment to be made." "No phase of metabolism," says he, "has been described in cancer which does not have a counterpart in non-cancerous conditions. This applies to such questions as the nutritive relations between the cancer cells and the normal body tissue, to the nitrogenous balance, retention, elimination of sodium chloride, excretion of acetone, the relation of ammonia excretion, and a possible acidosis." He adds, however, "Diet doubtless forms an important part in the growth of cancer, possibly even in the origin of the disease." It is encouraging, therefore, to find that this able and careful laboratory investigator recognizes, in a measure, the basic cause of diet, toward which all evidence points so strongly, although the definite connection may not yet have been established by laboratory methods.

In all our study in regard to the relation of diet to cancer it must be remembered that there are divers elements and agencies which combine to produce the many and various disordered conditions of the body, to which we give the names of different diseases, and that cancer is no exception to this general rule. For instance, in old-fashioned gout the patient may have consumed an excess of Port and Madeira wine for years before the system finally rebelled and acute gout resulted; and among the causes for the systemic reaction we know that frequently it is great mental strain or shock which has so disturbed metabolism that the wine was no longer tolerated. Much the same is true in regard to cancer and nitrogenous diet. And we will see later that mental disturbance and nerve strain or shock often seem to be causative elements; also that constipation, or intestinal stasis, is so common in cancer sub-

jects that it must be looked upon as one of the contributing causes among others, to be mentioned later.

Although it is quite possible that many of the reported bio-chemical changes found in primary cancerous tissue and metastases may not be of etiological importance, it may be interesting to briefly refer to some of them as indicating the vital alteration in tissues connected with what we recognize as malignancy; even as in acute and chronic gout the affected tissues exhibit abnormal conditions in regard to uratic deposit.

Many writers, some of them dating back many years, agree that albuminous constituents predominate in cancer tissue, and, as in actively growing structures in general, sugar forming substances abound. Wolter states that cancer of the breast contains 20 per cent. more nucleo-proteids than the normal breast. Casein is also present in breast cancers, and the abun-

dance of fatty matters, contained in the cells of such neoplasms, is well known. In regard to the proteids, Wolff, after many studies, concludes that their character is identical with that of normal tissues, and it is only the quantitative distribution of these that differentiates the tumor from the physiological tissue. Wells agrees with others that there is no very distinctive character in the bio-chemistry of malignant tumors, but by reason of their excessive chemical component, as compared with benign tumors, they naturally show a high content of nuclear proteins; they, therefore, contain a high proportion of phosphorus and iron.

Interesting observations have also been made on other characteristics of cancerous tissues, such as the great abundance of enzymes of great variety which are actively autolytic, also in regard to certain relations of cholesterin, in regard to which Ewing has recently said, "There appears

to be something in the chemical or mechanical nature of the irritation of cholesterin which is peculiarly effective in producing atypical proliferation of epithelium''; this has been found to be no less than 65 per cent. greater in quantity in fatty deposits, as in the mesentery, in subjects of cancer than in healthy persons, etc., etc. It would weary you to no purpose to attempt to refer further to the bewildering mass of research studies in connection with the biochemistry of cancer which are found in special literature: much of it is fragmentary and some of it contradictory, but all has its value as contributory to our knowledge of the actual conditions developed in connection with cancer growth; but up to the present time it cannot be claimed that any very practical results have been thus attained which will aid us in treating the disease.

As all cell life and proliferation of tissue depends on the activity of the cell nu-

clei, much attention has been paid to the changes found in them and the behavior of the centrosomes and chromosomes, all of which is too technical for us to consider here: suffice to say, however, that several observers have demonstrated heterotypic mitosis in malignant tumors, and that histologic examination confirms what other judgment has indicated, namely, that the cancer cell differs from a normal tissue cell mainly in its aberrant action under some stimulus, probably derived from the animal fluids by which it is surrounded. Thus we come back to our original proposition, for these fluids are, of course, but a reflection of the nutrition of the body or diet, as modified by the action of the various organs, including the internal secretions; all this is influenced again by the action of the nervous system.

It is difficult to produce definite proof in regard to the influence of nervous and mental strain and shock in the production

of cancer, but careful observers have long claimed that there is such an influence, and from what I have seen I am firmly convinced that in some way these conditions often do so disturb the metabolism, or otherwise operate, in such a manner that cancer results. The influence of the mind upon the body is unquestionable, as has been so fully illustrated by Tuke, and from what I have observed I cannot doubt but that the mental depression common in those with the beginning of a process which they fear might result in active cancer, has much to do with accelerating its growth; whereas, on the other hand, the hopefulness which can arise with the attempt to change the diseased process by diet and proper medication, has much to do with the favorable results which may follow in suitable cases. In the same way the constant fear of recurrence after operative removal can have its share in inducing and perpetuating the metabolic

error which excites the tissues to renewed cancerous action. I know that some of you will think that this is fanciful theorizing, but many a scientific fact, in many branches of science, has been worked out from a theory which at first has seemed fanciful.

We will now consider some of the data which have been recorded in regard to the relation of the secretions and excretions of the body to cancer, including the internal secretions.

Much labor has been expended, by very many observers, upon the analysis of the *urine* in connection with cancer, as that might be expected to reveal the metabolic changes connected with this disease. While many departures from the normal have been reported, and while under complete volumetric analysis the urine of a subject of cancer is rarely if ever that of health, it cannot be said that any definite and specific changes have been established

which may not be found in those without cancer; although there have been several who have so claimed even diagnostic signs from the urine. But minute, volumetric analysis is often of great service in guiding the nutrition and medication of these patients, and gross errors are continually met with, which have the greatest bearing on the case in hand, as indicating very great metabolic disturbance: and constantly the urinary excretion will be found to be extremely deficient, both as to its quantity and its total solid elimination. In one very interesting case of cancer of the breast, in a stout, flabby lady, near 55, in private practice, the total daily quantity of the urine, measured for weeks, is always very far below the normal amount; and in spite of active medication it seems almost impossible to raise the total daily solids excreted in the urine, to more than one-half of that called for by the weight of the patient. We may now briefly consider

some salient points reported in connection with the urine in cancer.

As remarked in regard to other elements in the study of the disease, it would be very desirable to have a knowledge of the urine in pre-cancerous stages of health, or ill-health, and also in very early cancer, likewise after surgical operations, that we might better understand the metabolic changes which lead up to malignant disease; but unfortunately these are exceedingly few and unsatisfactory, and almost all the studies have been made in advanced cancer, and often when the disease has affected vital organs, or when by its own poison it has disturbed the workings of the economy.

Many observers agree that there is a disturbance of proteid metabolism in cancer, and dependent upon this many deviations from normal are found in the urine, some of which in turn are related to the inanition which occurs. The *urea* is almost

invariably diminished, often very greatly, as I have verified time and again in many cases.

A number of studies have been made upon the nitrogen partition in cancer by Einhorn, Kahn, and Rosenblum, also by De Bloeme, Swart, and Terwen, and others, showing an increase in colloid nitrogen, to more than double the normal amount, increased elimination of xanthin, oxyproteic acid, and urinary ammonia, together with many other changes which show that disintegration of the protein elements is very imperfect and often excessive. An interesting statement is made by Blumenthal that the oxyproteic acids are increased even in very early cancer, and independently of the size of the tumor and degree of cachexia, seemingly showing them to have some specificity for cancer, because they have not been found in other forms of malignancy. He also states that urobilin is increased in a large proportion

of cases of cancer, especially when cachexia is setting in, and is a grave symptom.

Reid, who has confirmed many of these matters reported by others, says: "I have found an increase of amino-acid nitrogen in practically every case of cancer I have examined"; . . . "Hence we can only infer that in cancer, the liver, while not involved in the disease, is still unable, for some reason, to perform its functions in synthetizing urea. The organ is functionally injured, no lesions having been found to explain its insufficiency"; or possibly . . . "cancerous subjects form proteids which the liver is unable to deal with, so that they are excreted unchanged, or nearly so." Degrez has made confirmatory studies along these lines, and found the nitrogen disintegration very imperfect, with increase of the ammonia fraction of nitrogen, and increased elimination of xanthin bases. He states that "the toxicity

of the urine is increased apparently as the result of the presence of substances which have not been fully oxidized.''

Notable changes have also been recorded concerning the *sulphur* elements in the urine, with a great increase in neutral (unoxidized) sulphur and a considerable excess of sulpho-cyanic acid, together with an increase in sulphates and indican showing the results of intestinal fermentation of protein elements, which also I have constantly observed.

The *chlorides,* on the other hand, are, as a rule, diminished in cancer, especially in its late stages, when there is inanition or kidney insufficiency; and probably any change in them has only a relation to the nutrition of the patients, for the chlorides come from the food and are commonly an index of the amount of nutriment absorbed. Robin finds some relation between the excretion of chlorine and nitrogen, according

to the stage or degree in which the system is affected by cancer.

The *phosphates* are known to be increased in the urine of cancer subjects, although irregularly and in an inverse ratio to the chlorides; as inanition increases there is greater autolysis of cellular structure, and the nuclei yield an excess of phosphates, which are excreted in the urine. A more or less general demineralization of the system through the urine has been observed by several, and has been recognized as a significant matter, and is of special importance when we consider what an important part minerals take in the nourishment of cell life.

While the changes which have been observed in the urine in connection with cancer are not wholly pathognomonic, but occur in connection with other diseased states of the system, so that none of them can be accepted as diagnostic of malignant

disease, they all have a certain significance as indicating the metabolic changes which accompany and, as we believe, have much to do with the etiology of cancer; and, as stated before, a careful, systematic, and frequently repeated volumetrical analysis of the urine certainly assists greatly in the proper management of these cases, that is when the departures from normal are carefully studied and correctly interpreted.

The *saliva,* and its action, constitutes a very important part in the process of digestion, and consequently of metabolism and the genesis of cancer; far too little attention, however, has been paid to it practically, in ordinary life or disease, although there have been many laboratory studies and writings on the physiological action of this secretion; but I have not been able to find in literature any investigations relating to its condition in cancer. And yet the experience and writings of Mr. Fletcher and others have demon-

strated wonderful results from perfect mastication and thorough insalivation, and a careful consideration of digestion must convince every one of the importance of this secretion in connection with nutrition, both in health and disease.

Our time does not permit of more than a brief allusion to the subject, but in cancer patients I have so constantly found the salivary secretion acid, and often strongly so, instead of the normal alkaline or neutral, that I cannot but believe that this condition has some bearing upon the subject which we are studying; the saliva also is apt to be acid in diabetes, which is closely allied to cancer. It is to be remembered that the saliva, which amounts in health to between one and two quarts daily, varying somewhat with the food, is not wholly for the purpose of lubricating the mouth and facilitating deglutition, but its enzymes, ptyalin and maltase, effect radical and important changes in the starchy matters

consumed. It is also to be remembered that the latter cannot be acted upon by the stomach secretions, but must be passed on to the influence of the pancreatic fluid in the small intestine, in case the action of the saliva has not been effective; hence there follows delayed and imperfect digestion, faulty metabolism, deranged nutrition, and possibly tumor growth. The importance, therefore, of very slow eating, thorough mastication, and perfect insalivation cannot be too strongly insisted on, both as an element of importance in the prevention of cancer, and also as a curative measure in patients in whom the diseased process has already manifested itself.

The so-called *internal secretions* have also been the subject of much research and speculation of late years, in regard to their influence on metabolism and the life processes of the economy, and many studies have been made concerning their connection with cancer, which cannot be long

dwelt upon now; but there seems to be little doubt but that the secretions of the ductless glands in common have much to do with regulating the metabolism of the cells. We know, for instance, that disease of the pituitary body produces bone disorder, resulting in gigantism, that thyroid derangement results in myxœdema, and that disease of the supra-renal capsules gives rise to Addison's disease, or bronzed skin; and it is not at all impossible that the derangement of secretion of one or more of these and other organs may be an element in the disordered action of certain epithelial cells, resulting in cancer. Harrower calls attention to the fact that cancer is essentially a disease of that period of life when certain of the ductless glands lose their normal function, this loss entailing related changes in the whole chain of interrelated functions of the ductless glands.

The *supra-renal* glands by their secre-

tion have, as we know, great vaso-constrictor influence, and their complete removal is followed by death; it is more than possible that some failure in this secretion allows the exuberant blood to supply cancerous growths. Sajous says: "Certain growths, particularly the more malignant forms of sarcoma and carcinoma, seem closely connected with adrenal insufficiency and its normal consequences," and there have been some clinical and research data confirming such a conclusion. Sajous further says, "The adrenals, as supporters of the thyroid apparatus in the defensive process, and in sustaining oxidation, metabolism, and nutrition, seem to offer a new clew to the pathogenesis and treatment of cancer that is worthy of further inquiry."

The *pancreas* has been thought to have some influence in a perverted metabolism leading to cancer, Kahle stating that there is a retention of silica in that organ in cancer patients, to even double the normal

amount. A treatment of cancer introduced by Beard, also strongly presented by Saleeby, by trypsin and amylopsin, the enzymes of the pancreatic fluid, excited some attention a while ago; but unfortunately no satisfactory results have thus far been obtained from this line of medication, as was fully demonstrated by Bainbridge at the New York Skin and Cancer Hospital, in one hundred cases.

The *pituitary gland* by its secretion has undoubtedly some coördinating power, with the adrenals and thyroid, over the processes of metabolism, and a number of observers have regarded it as of importance in connection with the genesis of cancer. Little has recently reported some cases of cancer in which *pituitary extract* with that of the pancreas has produced remarkable results.

The *thyroid* is now recognized as playing an important part in assisting metabolism, and, like the adrenals and pituitary,

its complete removal, with the parathyroids, in animals is followed by death. While the study of the hormones is still in its infancy, there seems to be no question but that the endocrinous glands act conjointly, the one influencing the other, and that together they exert a very great influence in the life processes of the body and on the behavior of its component cells. The thyroid has been shown to be one of the main factors in the management of calcium within the body, which is believed to be an element in cancer, and enhances the catabolism of toxic wastes, which are etiologic elements in this disease. Many have reported favorably on the effect of thyroid feeding in cancer, and after an experience with it in many cases I am convinced that it has been one of the means which contributed to the good results obtained. On the other hand it has been claimed by Stuart-Low that the surgical removal of the thyroid, or part of it, or ligation of the

thyroid blood vessels has arrested cancer, in several cases.

Thymus gland feeding has also been reported on favorably by a number of observers (Rohdenburg, Bullock, and Johnson, also Gwyer), they reporting relief of pain and improved general conditions, notably gain in weight and increased hæmoglobin in all but one of sixteen cases, though some of them died. On the other hand Ross reports most unfavorably on the administration of thymus, which he gave to some inoperable and hopeless cancer cases, in which he said that in two or three weeks the tumors had quadrupled in size and the condition of the patients was very much worse; the same occurred also when some cancer patients were given calcium salts freely. Ross makes some interesting suggestions in regard to the thymus, and its relation to calcium and magnesium; these latter are freely utilized in the growth of bone up to the age of twenty-

five years, by which time the thymus gland has quite disappeared; but after this time these salts tend to have pathological relations in various tissues, and also cancer becomes frequent.

The internal secretions of the *testicles* and *ovaries* are also thought to have some share in metabolic processes, and observations have been made in regard to their influence in cancer. Thus Cahen reported that Beatson's operation of castration for cancer, done first in 1896, had been repeated by many, so that Lott had reported 99 cases including his own. Of these in 23.2 per cent. the operation caused a distinct improvement in the cancer. In 15 cases the improvement persisted for a year, in 4 cases for 4½ years and in one case for over 5 years. Cahen operated on seven women with remarkable results; in two cases life was prolonged 4 and 6 years respectively. Others, however, have shown by statistics, that damage to the ovaries by

disease, or their removal by operation, greatly increases the proclivity to cancer. Several writers have connected cancer with the waning of the sexual powers, and the suggestion is made by Sherrington and Copeman that in the period which antedates the cancer age, the reproductive glands, by means of internal secretions, are able to inhibit the growth of cancer.

In looking back over what has been observed in regard to the secretions, including those of ductless glands, we see that very strong evidence has accumulated to show that they have a very intimate connection with the development of cancer, as was to be expected, since they are very important factors in connection with metabolism.

We have also seen that while there has not been demonstrated any very definite and specific change in the bio-chemistry of tumors, and no specific enzymes or poison secreted by cancer cells which can com-

municate the disease, there is evidence that the disordered cells secrete a something which deranges the blood and ultimately tends to end life; for the blood in advancing cancer undergoes very radical, degenerative changes, some of which improve decidedly when a cancerous mass is removed surgically, but return with the regrowth of the tumor.

We have also seen that the urine manifests alterations which show a disturbed metabolism, and that the saliva has an abnormal acidity leading to disturbed amylaceous digestion.

We have further seen that there is evidence that the internal secretions of many organs, probably, through their influence on metabolism, are factors of importance in connection with the genesis and cure of cancer. Little well says, "Cancer is a disease of disordered nutrition, as a result of which cells revert to a primitive stage, which permits reproduction. The disor-

dered nutrition is due to relative hypofunction of the ductless glands.'' In later lectures we shall consider the basic causes of this deranged nutrition, which, as has been already intimated, has much to do with diet and the various elements of life which tend to induce functional and other derangements of the system, many of which are included in and influenced by what we term the advance of civilization.

LECTURE IV

RELATION OF DIET TO CANCER

In our earlier lectures we saw that cancer was undoubtedly a diseased action of originally normal tissue cells, due largely to perverted metabolism, the special features of which were brought out last week. In the second lecture we studied the frequency and geographical distribution of cancer, which was found to be very different for various peoples in diverse sections of the earth, and which we saw was proportioned in a great measure according to their diet and mode of life. In this lecture we will examine into the details of these matters more particularly, and endeavor to discover their practical bearing upon the prevention and cure of cancer.

For the proper understanding of the relation of food and drink to cancer, and the satisfactory application of the principles involved, it is necessary to bear well in mind the chemistry of the body and the relation to nutrition of the various elements which contribute to form healthy and diseased tissues.

The human body is composed of some fifteen different elements, the relative proportions of which may be understood by the following table from Sherman, which represents probably as approximately correct an average as any that can be given.

COMPOSITION OF THE HUMAN BODY

	Per cent.
Oxygen, about	65
Carbon, about	18
Hydrogen, about	10
Nitrogen, about	3
Calcium, about	2
Phosphorus, about	1
Potassium, about	0.35
Sulphur, about	0.25
Sodium, about	0.15
Chlorine, about	0.15

	Per cent.
Magnesium, about	0.05
Iron, about	0.004
Iodine, Fluorine, Silicon	very minute traces

As the actual composition of the body is changing day by day, through the activities of the system, so that it is commonly believed that after some years all the tissues are entirely renewed, the daily wear and tear, as also the material expended in heat and activity, must be supplied by the diet. For the ordinary requirements of the system, in health, the appetite serves as a guide, which should suffice in man as in wild animals, to preserve the balance of nutrition. But man has also the power to *gratify the taste,* which must be recognized in our study as distinct from the satisfying of the appetite; and the refinements of civilization have added so greatly to the temptation of wrong and over-eating and drinking, as they have to many other temp-

tations, that it is questionable if reason, and what is often spoken of as the natural instinct for food, can be trusted in mankind.

It is to be remembered that the advance of civilization, and the facilities of transportation and cold storage, have brought from far and near an innumerable number and variety of articles for food and drink, including condiments, which bear no relation to the few simple articles formerly consumed; even the fruits which we eat are rarely ripened fully by nature, but are picked more or less green, and undergo an artificial ripening without the action of the sun, which is really akin to decay. In the combination and preparation of articles of food also, so-called civilization and refinement have made the greatest departure from the simple life of the aborigines, who are free from cancer, and with increasing ease and wealth throughout the civilized world more and more individuals are shar-

ing in unnecessary and often harmful indulgences, more and more freely: and this is especially true of animal food, the consumption of which has increased so greatly. Many other elements likewise enter into the matter of the digestibility and consequent nutritive power of food and drink; such are nervous conditions, rapid eating, imperfect mastication and insalivation, heat and cold, character of the air breathed, micro-organisms, etc., and all the various causes which may derange the action of the digestive organs and so prevent the perfect metabolism between nutrient material and the cells of the body, as I tried to show you in some former lectures.

As is well known, the nutrition of man is supplied by the organic substances, protein, carbohydrates, and fat; these are found in various combinations in animal and vegetarian foods, and as a rule contain also much of the inorganic or mineral substances necessary for the system; all of

these with water, and its salts, and oxygen, supplied by the lungs, unite, through anabolism and catabolism, to build and maintain the human body in health.

It is also well known that in order to preserve health and proper weight there must exist in the economy a certain balance or equilibrium between the amount of the ingesta and excreta, representing the various elements which enter into nutrition; thus we speak of a nitrogen equilibrium, a carbo-hydrate equilibrium, a phosphorus equilibrium, and iron equilibrium, etc., some of which are disturbed continually in ill health and in various diseases, including cancer, as has been shown in our last lecture.

Until quite recently the principles of diet (even if not often carried out in practice) have been established on lines laid down by Carl Voit, of Munich; this eminent physiologist, after studying the dietary habits of various classes of workers, claimed that

the adult man of 150 pounds, doing moderate muscular work, requires daily 118 grams of protein or albuminous food, 56 grams of fat, and 500 grams of carbohydrate, with a total fuel value of 3000 large calories, in order to maintain the body in equilibrium. But the remarkable and scientific experiments of Chittenden have demonstrated beyond question that perfect bodily and nitrogenous equilibrium can be maintained with one-third of the amount of protein called for by the Voit standard, and with a total value in the diet of only about 1600 calories, or about one-half of that indicated as necessary by Voit. These experiments were based on a group of five men of varying ages, professors and instructors at Yale, thirteen volunteers from the Hospital Corps of the United States Army, and eight students in Yale, all thoroughly trained athletes, twenty-six in all.

It would be quite beyond the scope of

this lecture to enter at all into the intricate questions connected with the metabolism of nitrogenous and other foods, but Chittenden has well put the reasons "why prominence is given to the establishment of nitrogenous equilibrium and why the proteid intake assumes a greater importance than the daily amount of fat and carbohydrate consumed. Fats and carbohydrates when oxidized in the body are ultimately burned to simple gaseous products, viz., carbonic acid and water. Hence these waste products are easily and quickly eliminated and cannot exercise much deleterious influence, even when formed in excess. . . . With protein foods, on the other hand, the story is quite different. These substances when oxidized yield a row of crystalline, nitrogenous products which ultimately pass out of the body through the kidneys. Prior to their excretion, however, these products—frequently spoken of as toxins—float through the body and may

exercise more or less of a deleterious influence upon the system, or, being temporarily deposited, may exert some specific or local influence that calls for speedy removal. Hence the importance of restricting the production of these bodies to the minimal amount, owing to their possible physiological effect and the part they are liable to play in the causation of many diseased conditions.''

When we consider the small share which nitrogen plays in the composition of the human frame, as shown in the table presented, only three per cent., it is easy to see how an excess of nitrogenous food must necessarily either pass off unassimilated or undergo imperfect metabolism, and so derange the general metabolism; and this is found to be the case in many conditions of disease, and, as has been shown, in cancer. Chalmers Watson and others have shown in a most remarkable manner, by animal experiments, that an

excessive meat diet alters very materially the microscopic structure of very many organs and portions of the body.

Beneke, who is often quoted, was one of the first to seriously consider the actual diet beneficial in cancer, his observations dating back to 1875 upon material in the service of Esmarck and Oldehop, who treated patients according to his plan. While the diet he gives is not wholly vegetarian, he limits the nitrogenous intake very greatly, and reported some very favorable results, with the complete disappearance of some malignant new formations.

Referring now to the data presented in the second lecture, in regard to the frequency and geographical distribution of cancer, we can understand better, on scientific grounds some of the reasons why cancer is so steadily increasing in civilized communities, and why in some sections of the earth it is less common, while certain

aborigines have seemed to be almost immune.

We found that in England the per capita consumption of meat was 130 pounds per year, and that it had doubled during the past fifty years, while during the same period cancer had increased *four fold;* but in Ireland, where the meat consumption was estimated in 1895 at only 40 pounds per capita, or less than one-third that in England, the cancer death rate is very much lower, not much over one-half. We found that in Italy, where the per capita consumption of meat was the smallest of any European country the cancer death rate was almost the lowest. Also that in certain other countries, where vegetarianism was the rule, cancer was very infrequent, while among certain aborigines the disease was practically unknown; but we found also that in both the latter classes of individuals cancer has slowly increased, in proportion as the inhabitants of different

sections had come under the influence of modern civilization, and adopted the dietary and other habits of foreigners.

In the United States cancer has certainly increased very greatly during the last fifty years, and statistics were presented showing that in seven of the largest cities, during the past five years, the number of cancer deaths had augmented between seven and eight per cent. It is known that the consumption of meat here has increased steadily, until in a communication from the Bureau of Agriculture in Washington we learn that it had recently reached the enormous amount of 172 pounds per capita yearly, much more than in England.

Cancer has been repeatedly spoken of as a disease of civilization, and there are many other elements besides meat to be considered in connection with its etiology.

Coffee and tea are so widely and almost universally used in civilized countries, and their apparently pleasant effect is so great

that few realize the harm that may result therefrom; although from time to time their injurious effects, especially along the line of digestive and nervous troubles, are dwelt on by medical writers. Of late years, however, more attention has been paid to their influence on metabolism and also to the relation of their consumption to the increase of cancer. From a report to the House of Commons in England, Holland is shown to be the largest per capita consumer of coffee of any country in Europe, and the cancer death rate there in 1905 was among the highest, while Hungary was the smallest consumer of coffee, and the cancer mortality in 1903 was only 39 per 100,000, or a little over one-third that in Holland. It may be interesting to know that Thompson states that "the people of the United States consume one-third of the total coffee produced, or more than Germany, Austria, Hungary, France and the United Kingdom combined. On the

other hand England and her colonies consume one-half of the world's output of tea, and the United States but one-fifth of it."

The scientific basis of a possible relationship of the consumption of coffee and tea to the prevalence of cancer may be better understood when we remember that caffeine and theine belong to the xanthin group, and contain exactly the same equivalent of nitrogen as uric acid. A single cup of coffee of fair strength, it is stated by Hutchinson, contains from one to three grains of caffeine, and a cup of fairly strong tea 1.21 grains, or more than the average medicinal dose of this drug; and all know how great may be the consumption of coffee and tea by some individuals, and that many of the working class, especially, consume enormous amounts of tea, which is kept brewing all day. Roberts has very clearly demonstrated, by clever experiments, that tea interferes very

greatly with both the salivary and gastric digestion.

Alcohol, or some of its combinations, has also been shown by several observers to be undoubtedly an element contributory to the causation of cancer; this relates not only to countries or cities where the consumption is the greatest or least, but also to various occupations, in which statistics show the more or less abundant use of distilled or fermented drinks, and deaths from the same, and in regard to total abstainers; and a careful study of the subject makes it pretty clear that the incidence of cancer corresponds in a measure with drinking habits; that is, that cancer mortality is highest among those classes of persons among whom primary or secondary mortality from alcoholism is greatest. There are so many elements to be taken into consideration in connection with the derangement of metabolism which leads to cancer, that it is difficult to fix the precise

influence which each may exert; but in watching cancer cases for any length of time it is easy to see the harmful effect when alcoholic beverages are indulged in, and the improvement when all such are absolutely excluded.

An interesting confirmation of the beneficial results of a low diet and simple life, as regards cancer, is found in certain reports of Commissioners of Prisons and Asylums in England, where the matter has been studied, as given by Russell. "Asylums contain an excessive number of persons who have inherited or acquired constitutional weaknesses, and in many cases tendencies toward consumption or cancer; also many alcoholics who are prone to these maladies. Yet the habits and rules of these institutions reduce the cancer rate much below the rate of the classes from which they are drawn, and below the rate of both occupied and unoccupied persons." The same is observed in regard to many

religious orders, where the members lead a very simple and frugal life, and where cancer is reported to be almost unknown.

Kessler has called attention to the disturbance of sulphur partition in cancer in connection with diet, and the desirability of excluding those foods exhibiting an excess of sulphur, giving lists of the same and indicating a satisfactory diet.

Packard has made a strong argument in regard to the value and importance of the mineral elements contained in plant life, in connection with the disturbances in these same elements which has been observed in connection with cancer, as we have already seen. He recalls that modern chemistry teaches that the inorganic principles of the vegetable kingdom are absolutely necessary to the highest degree and type of animal tissue and health, and resistance to disease. Plant life is the connection between the minerals and salts of the earth and animal life, but in the

manufacture or refinement, and cooking, of products of the vegetable kingdom, many of them are largely demineralized; this especially illustrated in the case of fine white wheat flour, rice, potatoes (in peeling and cooking), etc. So that while animals get plenty of mineral matter from plants and the earth, man gets but little, and while the herbivorous animals are rarely affected with cancer, civilized man is succumbing to it more and more. It is stated that among savage tribes, who are practically free from cancer, the water in which vegetables are cooked is also consumed as food, thus securing all the salts. The same idea has been popularly presented to the public in a startling manner by McCann in a book which, with a great deal of verbiage contains a large amount of valuable information concerning nutrition, and its disturbance by erroneous, or worse, preparation and administration of food.

Possibly there are other dietary elements which may play some part in the causation of cancer, but the demonstrated facts in regard to them are so few and uncertain that they need not detain us here, although it is certainly desirable to investigate any that seem to have reasonable support.

Some of these which have been suggested probably have to do with local irritant action on the digestive organs, as we have previously seen that local irritation undoubtedly plays an important part in the determination of the actual time of occurrence and site of the cancerous disease. Thus, some have ascribed cancer to hot food or drink, or to stimulating drink, condiments, etc. It is quite possible that these contribute to the development of cancer in the pylorus, irritating the secreting cells in their passage. Mayo says: "In civilized man one-third of all cancers are seated in the stomach. This is not known

to be the case in uncivilized man or in animals. There should, therefore, be something—some one cause—which causes this preponderance. The acid secretion may favor its development, for when we come to the colon, also with an acid secretion, we again meet with cancer, and we seldom see it in the alkaline, small intestine. Gastric ulcer, which may be precancerous, is connected with hyperacidity.'' In Scandinavia cancer of the stomach is remarkably frequent, according to Soëgaard, thus, of 1235 cases in Norway, 73.9 per cent. were in that location. In our last lecture we found that cancer in general was connected with a lowered alkalescence of the blood, and all our studies show hyperacidity to be related to cancer genesis; and nitrogenous acidity, or uric acid (purin, xanthin, etc.), undoubtedly plays a great part in inducing malignant action in tissues, as Haig has so long contended, even in regard to cancer.

The increasing frequency of cancer of the mouth, œsophagus, and stomach in men certainly looks toward an irritating character of substances which traverse these regions, including alcoholic drinks, and the irritant effect of tobacco should not be overlooked in regard to mouth lesions. But of the millions who use tobacco only very few are affected with cancer, and only those who are predisposed thereto by some metabolic disturbance, whose true character and other manifestations are not yet fully determined. We have already referred to the practice of so-called betel chewing in the Far East as a frequent cause of cancer within the mouth, also to the wearing of the Kangri charcoal baskets in India, for warmth, causing a burn on the front of the body which may develop into epithelioma; it is claimed, however, by by some that of the many cases of "Kangri burn," but few result in epithelioma.

There are yet other considerations con-

cerning the relation of diet to cancer which are worthy of attention. We have mentioned some principal agents, which seem unquestionably to have an influence in the production and continuance of cancer, namely, proteids, coffee and tea, and alcoholics. But millions of human beings partake of these with apparent impunity, while in the relatively few they appear to have cancer-genetic powers. This need not surprise or puzzle us any more than do the many other problems in medicine which we are seeking to solve: for we know how often it happens that the system reaches a point where certain things, once well borne, are no longer tolerated. We know, for instance, that Port and Madeira wine certainly can cause gout, but with many individuals they may be indulged in freely for some time before this result follows: likewise that tobacco may even be abused for a long time, without apparent ill effects, when suddenly there is a revul-

sion of the system and the slightest use of tobacco will be intolerable: also that many edible substances which have long been well borne, will at a certain time act unfavorably and excite eruptions, urticaria, acne, eczema, etc.

Psoriasis also furnishes an illustration which may be of service in understanding the relation of diet to cancer; for psoriasis is characterized by a disordered epithelial growth, which both shows on the surface and manifests itself by epithelial prolongations into the corium, which are quite comparable to the ingrowing cellular masses of early cancer: moreover cancer is not very rare in psoriasis patients. In this eruption it has been very clearly demonstrated, clinically and experimentally, that error in nitrogenous metabolism is commonly at the bottom of the eruption, which has been seen to promptly disappear entirely simply under an absolute vegetarian diet, correctly regulated, excluding also

coffee and alcohol, without the use of any medical treatment whatever, internal or external; but, of course, this result cannot always be obtained, and sometimes the eruption will relapse during what is thought to be a strict vegetarian diet. There must, therefore, be some systemic disturbance which causes nutritive material, at some particular time, thus to derange cell action in the eruptions mentioned, and the same is true in regard to the production of cancer.

Some years ago Braithwaite called attention to the occurrence of cancer among certain peoples who were vegetarians, and attributed it to the great amount of salt which they consumed. While the suggestion of salt being a cause of cancer has been ridiculed, it is quite possible that a great excess of sodium chloride may disturb the salt equilibrium in the blood, by replacing the potassium which is so necessary for proper cellular nutrition, and also

by hindering the excretion of uric acid, as Haig has pointed out.

When we inquire into the cause of the systemic disturbance which tends to such faulty metabolism that the nutrition of cellular structures is deranged, even to the degree of taking on malignant action, we find many possible elements, more or less connected with what is known as modern civilization, to which we have time to but briefly allude. Williams has shown pretty clearly that wealth, with its tendency to luxury and idleness, greatly increased the proclivity to cancer: not only is this observed in different countries, but in certain cities the difference is very striking between the cancer mortality in sections which are occupied by the rich and well-to-do, and those in which the poorer classes are herded. Also in England it was found in one decennium that cancer mortality was more than twice as great among the well-to-do men, having no specific occupa-

tion, as among occupied males in general, the ratio being 96 to 44.

Change in the mode of life, and sudden changes of environment have also been found to have a great effect in the production of cancer, as has already been mentioned in another lecture.

Finally, for our time does not permit a fuller discussion, nervous conditions unquestionably can and very often do exert a profound influence on the secretion of the various organs of the body, and can so disturb digestion, metabolism, and nutrition that the most varied results may follow, to which the names of different diseases are given; so that nerve strain, more or less incident to modern life, must be accredited with a certain share of influence in the production of cancer. The part which imperfect and deficient intestinal and urinary excretion play in inducing or perpetuating the disease will be treated of in later lectures.

In our next lecture we will consider certain matters relating to the medical treatment of cancer, but from long experience and study I am firmly convinced that such measures are of relatively little service unless coupled with a rigid care of the diet and hygiene. As Bell remarks, "Cancer is essentially a disease supervening upon a persistent neglect of hygienic laws." It is a disease of sub-oxidation, and all the hygienic elements of importance in tuberculosis are equally necessary in cancer; fresh air and sunlight with, as far as possible, an ideal regulation of life in all its aspects, are indispensable.

Inasmuch as there is no specific medical antidote for cancer, and we cannot be certain of securing at once the metabolism of health, it is wise to remove and to keep away from the system those articles which have been shown to have more or less influence in its production, namely, animal proteids, coffee, tea, and alcoholics. Time

does not admit a discussion of vegetarianism, nor is it necessary, for there is abundant evidence in literature and on every side that perfect health can be maintained thereby, and I went over the subject pretty thoroughly two years ago. The vegetable kingdom contains protein enough to build up and maintain the tissues of the body, as is shown in animals, and an extra number of calories can be easily obtained from butter, of which a quarter of a pound contains some 800 calories, or fully one-third of the total daily quantity required by most individuals. The details of a purely vegetarian diet, which experience has shown to be of the greatest value in cancer, can be worked out for individual cases as required. I am also firmly convinced that in this absolutely vegetarian diet, with other proper hygienic and medicinal measures, to be detailed next week, we shall find a great power for the prevention of cancer; although many persons are already so

saturated with poisoned blood and tissues from prolonged errors of life, that perhaps no very striking general effect on the community can be obtained therefrom in this generation.

In closing this lecture I must again urge upon you the necessity of great patience and perseverance, with very much careful study of the patient in all particulars, over a great length of time, if really favorable results are to be obtained in cancer; and this is true whether the disease be incipient, or fully developed, or even post-operative. The causes of cancer are deep seated, and, as with many chronic affections, there is no tendency to continue an improvement once begun, but under a return to the same conditions as before the disease will certainly assert itself. We have learned the lesson of assiduous perseverance in tuberculosis; let us learn it in regard to cancer.

LECTURE V

MEDICAL TREATMENT OF CANCER

It is remarkable that so little serious attention has been paid to the medical treatment of cancer, in standard works, in view of the occasional strong statements and reports which have appeared from time to time in current literature and in occasional books, dating back for many years. Much of this, of course, relates to imperfect observation and erroneous diagnosis, and also to crude medical knowledge, but there have been also plenty of good men, who knew the disease and have reported favorable results, and even the complete disappearance of cancer, under dietetic regimen and proper medication alone, without operative interference of any kind.

Not to go back too far, reference can be

made to Lambe, who one hundred years ago wrote clearly in regard to the causation of cancer from luxurious living, and adduced strong proof to show the effect of diet in curing certain cases of undoubted cancer of the breast and uterus, the diagnosis of which was confirmed by prominent surgeons of the day, several of whom endorsed the vegetarian diet. Abernethy wrote pointedly, soon after, regarding the constitutional origin of tumors and says, "There can be no subject which I think more likely to interest the mind of the surgeon, than that of an endeavor to amend and alter the state of a cancerous constitution. The best timed and best conducted operation brings with it nothing but disgrace, if the diseased propensities of the constitution are active and powerful. It is after an operation that, in my opinion, we are most particularly incited to regulate the constitution, lest the disease should be revived or renewed by its disturbance."

He then gives an endorsement of Lambe's dietetic treatment of cancer, and presents several reasons why it should be fairly tried.

In the classical work of Walshe we find numerous references to the constitutional nature of cancer, original or quoted from recognized authorities, as well as expressions in regard to the futility of expecting that surgical interference would cure the real disease in any great proportion of cases. He says, "It would in theory appear that the removal of a tumor cannot in itself cure the disease, as the local formation is but a symptom of a general vice of the economy." . . . "This tissue being, as the normal textures, the seat of nutrition, is like them susceptible of its disordered actions," and he alludes more or less to the effect of diet on the disease.

The late Willard Parker, one of New York's great surgeons, in a study of 397 cases of cancer of the female breast, ob-

served from 1830 to 1880, wrote very strongly in regard to the constitutional relations of cancer. In considering the etiology he places constitutional causes first, and says, "luxurious living, and particularly excess in animal food, increases the waste products of the body, and if coupled with insufficient exercise, the waste products are retained in the system and have a tendency to produce abnormal growths." . . . "Cancer is to a great degree one of the final results of a long-continued course of error in diet, and a strict dietetic regimen is, therefore, a chief factor in the treatment, preventative and curative." Concluding his study he says, "There is such a *consensus* of opinion as to the advisability of early removal of the growth, that a discussion of the subject would be useless. So then, in the first place, let us remove the tumor, and thoroughly. But after we have done so, after we have taken it out by the very roots, is this sufficient?

No. We must then adopt the means stated above to prevent a second development. We must change the diathesis; we must seek to modify the patient's constitution so that it will be no longer prone to reproduce the disease: and then only may the surgeon be satisfied that he has done his duty." He further says, "In regard to the effect of abstemiousness on cancer I can speak with great positiveness, that vegetable, or at least a very bland diet, does check the progress of the disease, and, in some cases now under treatment, has been attended by an alleviation of symptoms; and in a few instances even by a recession of the growth." He also quotes from Sir Astley Cooper some strong language which, as he says, "shows a broader and more enlightened view of the subject than is contained in the writings of some more recent observers, who have supposed that they were working far in advance of the great English surgeon"; the rather

long quotation then given proves that that great surgeon also believed absolutely in the constitutional nature of cancer.

Sir James Paget is often mentioned by writers, sometimes even with derision, as a believer in the Constitutional Nature of Cancer, and his words are very strong; says he, "I believe it to be constitutional, in the sense of having its origin and chief support in the blood, by which the constitution of the whole body is maintained," and speaks at some length in his lecture, in support of this view; I will give you one other small quotation. "The existence of the morbid material in the blood, whether in the rudimental or in the effective state, constitutes the general predisposition to cancer," etc. It is remarkable that the views of this prince of surgeons and pathologists should not have carried more weight in regard to cancer, when his other views are so well accepted.

Time does not permit us even to refer

to the great mass of more or less similar views and corroborative evidence scattered in books and current literature during the last fifty years, but a few more references may be given. In 1884, and again lately, Merriam has called attention to cancer occurring as a reversion of tissue cells to earlier or embryonic forms under the influence of a disordered, or as he calls it, a poisoned blood stream, from over nutrition from a meat diet; and Haig has long maintained that uric acid is a prominent factor in the etiology of cancer.

While few will agree with Haig in all his conclusions, there is no doubt but that a faulty nitrogenous metabolism plays a not inconsiderable part in the causation of many diseased conditions, as has been also shown in a previous lecture to be true in regard to cancer: and while it may not be actually uric acid or urea which does the harm, as these are relatively harmless end products of metabolism, it is true that the

purin and xanthin bases, of many forms, and imperfectly oxidized nitrogenous elements, are active agents in the production of disease. Venus and Isenberg have both written very strongly in regard to the unquestioned value of a vegetarian diet in cancer, the former citing many supporters of the view, from ancient times to the present. If time permitted any amount more of corroborative evidence could be given in regard to the connection of cancer with metabolic disorders.

There have been many scattered articles concerning the chemico-pathology of cancer, all looking in much the same direction as that which we are pursuing, which cannot even be alluded to, but brief mention must be made of a most illuminating and suggestive study by Bristol. Reviewing the many theories of the etiology of neoplasms he shows pretty clearly that cell reproduction comes from outside the cell, or from the surrounding cell medium by a

process of diffusion, or by a definite chemical attraction, and is closely associated with the nutrition and growth of the cell, especially the nucleus; also that a fixed ratio between the salts in the blood, lymph, and tissues is necessary for normal activity and reproduction of cells; further that a disturbance in this ratio and an upset in the chemical equilibrium will lead to abnormal metabolism, growth, and reproduction, and result in an atypical growth in the local area involved.

As before remarked, it seems strange that the medical profession and the public have been so slow in accepting the views here presented. But both have become so obsessed with the idea that nothing can be done for cancer except operative procedure of some kind, and so dazzled with the glamour of modern surgery, so fascinated with the apparent definiteness of laboratory proceedings, and so attracted by the glory of purely scientific research,

that it is very difficult for any other doctrines to make headway: moreover, any dietary or medical treatment, prophylactic or curative, is very tedious and also difficult, in the way of attention to minute details, etc., and patients weary of restrictions and are restless at seeing little or slow progress made. Haig found the same difficulty with Hospital patients, but does not hesitate to state that in private practice "some undoubted cases of cancer have gotten well" under his dietary restrictions.

But when it is remembered that it is calculated that, under present existing conditions and treatment, fully 90 per cent. of those attacked with cancer ultimately die from it, and that there were last year nearly 50,000 recorded deaths from this cause in the "Registration area" of the United States, covering but two-thirds of its population, and that the disease is rapidly and surely increasing, it behooves the Medical Profession to put forth the best

efforts possible to stay the progress of the disease. In New York City, according to the Weekly Bulletins of the Board of Health, there were from May to November, 1914, in 26 weeks, 2173 deaths from Cancer, Malignant Tumor, or an average of 83.5 per week, almost twelve deaths daily from malignant disease.

Operative surgery has unquestionably been of great service in certain cases and along certain lines of cancer, and the claim for the earliest possible removal of morbid growths is certainly a just and proper one; moreover, with our present knowledge it is perhaps wise to attempt to remove the offending mass while there is some hope or prospect of benefit, and personally I am occasionally advising this in proper cases. X-ray and radium have also their sphere of usefulness in a certain class or group of cases, but the excessive exploitation of the latter, not long ago, did harm in raising false hopes in multitudes of sufferers, and

as these were shattered so also was confidence shaken in regard to all help for cancer from other than surgical removal.

But every one who has been brought much into contact with cancer knows full well what a mass of recurrent cases exist, possibly many of them due to bad operation, in regard to which surgery has to acknowledge that it can offer nothing more, that they are inoperable and therefore they are regarded as incurable. Every one also knows how many cases there are which have advanced so far before coming to a competent surgeon, that they are also inoperable. Every one likewise knows that there are numerous cases of cancer in internal regions, and in certain localities, and presenting peculiar features, which are also recognized as inoperable, at least with any proper justification. Thus it may safely be said that of the total number of cases of cancer existing at any one time, which would be included under the above classes,

fully 50 per cent. are such that operative surgery can offer no hope of material benefit: also, it must be acknowledged that but a relatively small proportion of all cancer cases are likely to secure the very best surgical service, such as claims the highest percentage of success.

For this large number of hopeless victims of this dire disease, at least, proper dietary and medical treatment should be most carefully studied and patiently applied, with the hope and expectation that the same, if correctly employed, would more or less hinder or check its progress or prevent a recurrence after operation. But experience shows that such measures, if taken promptly and thoroughly, can also prevent the development of early threatening lesions into those of malignant character, suggesting surgical removal, and these should never be neglected when there is the slightest suspicion of cancer. For it must be acknowledged that the surgery of

cancer is only an attempt at the physical removal of a something, which medical science and art should not have allowed to develop out of normal tissue. And in the matter of the general prophylaxis of cancer it is certainly worth while to consider and act strongly upon the facts which have been presented, especially in those individuals who have any hereditary suspicions, or who exhibit the habit of body or life which could lead to the development of cancer.

The medical care of cancer, as of all diseases, naturally includes both prophylaxis and the treatment of a morbid condition which has already developed; the former of these is always considered to be of the highest importance.

Prophylaxis of Cancer. From what has preceded in this and other lectures it can readily be understood that the prevention of cancer lies largely along dietary and hygienic lines, including such medical atten-

tion as shall secure healthy action of the secreting and excreting organs. If the figures and facts heretofore given are correct, if cancer has surely been observed to increase under certain conditions of life, if it is found to be absent or relatively rare under certain other conditions of living, if cancer has been known to disappear spontaneously in certain individuals, especially when they have changed their mode of living, it must then follow that when the exactly correct habit and state of life are continually assumed the disease will not occur.

In other words, when the blood stream nourishing the tissues is ideally correct, the individual cells of the body perform their functions normally, and as each cell is worn out it is removed by a healthy catabolism and renewed by a normal anabolism, and homologous cells then replace those which have ceased to be able to perform their function. On the other hand,

when there is perverted metabolism we have various forms of deranged action, to which we give the names of various diseases, one of which is cancer: here in place of homologous cells maintaining the tissues in a normal condition, we have a malignant metamorphosis into heterologous cells, which take on a disorderly or rampant action, and refuse to assimilate themselves to others, so as to form healthy tissue; we have then a mass of low vitality, tending to easily break down or ulcerate, and to extend their malignant action to adjoining tissues, under the continued influence of a contaminated blood current. When once ulceration has occurred, the ordinary parasitic micro-organisms, which are practically omnipresent, find an acceptable nidus, and aid in the destructive work, and also in the systemic poisoning of the tissues.

The aim, then to be sought in the prophylaxis of cancer is to secure the most

perfect blood stream possible, which is accomplished by simple living, perfect mastication, and the avoidance of excesses, especially along the lines of protein, tea and coffee, alcohol, etc., with the maintenance of healthy habits of life, especially in regard to bowel action. As already intimated, we do not know just why in some persons and at a certain time a disturbance of metabolism results in perverted cell growth, but there is, of course, a reason, and the physician's duty is so to regulate the patient's whole life that the metabolism is kept in the state of perfect health. All this seems very simple and trite, but really it is a task which is most important and often most difficult to accomplish, and requires very careful study and infinite patience. Dr. Kellogg, of Battle Creek, says that of the many thousands who have passed under his care he has not known cancer to develop in any one who had been faithful to the principles which he incul-

cates, and I may say the same of the many who have been under my care in private practice, often with notes extending over many years.

Time does not permit of going into detail here in regard to the special features of diet and hygiene, which I discussed with you fully two years ago, in my lectures, which were subsequently published: suffice it to say, as previously remarked, that the refinements of civilization add greatly to the temptation of over-eating, and wrong eating and drinking, as they do to numerous other temptations, and in many instances it requires the utmost amount of grit as well as patience, both in the patient and doctor, to secure the perfect result necessary.

It is understood, I trust, that I believe that for the proper treatment of cancer, and to prevent its occurrence and recurrence, it is absolutely necessary to maintain a perfect vegetarian diet, which in-

cludes even the exclusion of eggs and milk, with food; but the yolk of eggs may sometimes be taken with advantage, and also milk alone and separate, at a body temperature, one hour before eating, according to the plan which I have often demonstrated to you. As remarked in my last lecture, the vegetable kingdom contains proteid sufficient for the system, and the diet should be so arranged as to give the requisite quantity of calories, in proper proportion, of vegetable protein, carbohydrates, and fats: the latter is accomplished largely with butter, of which a quarter of a pound may be taken daily. Many writers on diet hold that the protein in casein acts differently from that contained in meat, and this is allowed in many vegetarian dietaries: it also contains phosphorus, which is an integral part of living cells, especially their nuclei. When nutrition seems to demand it, this can, perhaps, be added to the diet, mixed with cereals or in soups, and a small

amount of certain kinds of cheese is also sometimes allowable. It is impossible to elaborate the details of diet fully in a lecture such as this, and I must refer you to the many excellent works on food and nutrition (Hutchinson, Sherman, Thompson, Buttner, Braithwaite), for further information.

The *medical treatment of cancer* patients is a matter which should receive most careful and constant attention; indeed, the patient in whom cancer is threatening or has developed should be under the watchful and unremitting guidance of a physician who grasps the importance of the matter and is prepared to guard the health, and to meet and correct functional disorders as they arise; for a careful study of patients with cancer for many years has constantly shown me gross errors in their life and in the action of various organs, and consequently disorders of metabolism

which are of weight in connection with the disease.

The first point of importance to which I wish to call your attention is in regard to the action of the bowels. Some of you may remember that even that great surgeon, Sir Arbuthnot Lane, has recently emphasized the fact that one of the terminal results of intestinal stasis may be cancer. This may seem strange, but it would surprise you if you knew how very commonly there was imperfect intestinal excretion, or intestinal stasis, as it is now called, in these subjects; indeed, I might almost say that it is the rule, and that this assuredly plays a most important part in the auto-intoxication which leads up to cancer; in fact, I almost feel like saying that the toxins produced by the millions of micro-organisms generated through intestinal stasis and fecal putrefaction are the real, incidental cause of cancer. Under a perfect vegeta-

rian diet there is less likelihood of trouble in this direction, but even then there is necessity of watching continually, that there may be at least, one, full, free movement of normal character, daily, after breakfast. In many cancer patients I have secured this by having the entire potato eaten, skin and all, whether boiled or baked; by this means also one gets the full value of the inner layer of skin, which contains the mineral salts so necessary to the economy, which are entirely lost when the potatoes are peeled before boiling; so that potatoes should always be cooked in their skins, even if the outer layer is stripped off afterwards.

But the regulation of the bowel action should not be left to the judgment and action of patients, with a spasmodic use of remedies, and with alternate constipation and purgation; the physician himself should carefully guide and direct the proper treatment frequently enough to se-

cure perfect results. Of course each one may have their own ideas and methods, but I have long used with the best results the remedies which you have often heard me order in this clinic. Thus, at the beginning of treatment, and often on the same days of many succeeding weeks, I give ℞ Ext. Colocynth. Co., Mass Hydrarg āā gr. x Pulv. Ipecac gr. ij M. Div. in Capsules No. IV. Sig. Take two at night and two on the second night after. For continuous use, or in the nights between these, I have long used a compound Cascarin tablet (℞ Podophylin, Aloin, Cascarin āā gr. ¼) one or more each night, or have depended on the Cascara in a mixture of which I shall shortly speak. I do not like the action of salts or laxative mineral waters in these cases, and, of course, enemata are entirely useless to secure real, effective liver and intestinal action, and should be used only in an emergency.

The action of the *kidneys* is also always

a very important element to watch and control in cancer patients; this does not have reference to albumen and casts, or glycosuria, but to a functional derangement of the secretion: for the former are relatively infrequent compared to the latter. This is so large a subject that time does not permit of its elaboration; I made the matter pretty clear to you in my lectures not long ago on the relations of diseases of the skin to internal disorders. I must tell you, however, that, as a result of numberless studies of the urine of many cancer patients, I have almost constantly found a deficient or defective urinary secretion: in many cases I have had the total daily amount accurately measured, and reported in writing each week over long periods, and while the total quantity may at times be near normal, the total solids sometimes fall to, and remain at, even less than one-half the amount which should be passed for the patient's body weight.

I want here to urge upon you the importance and value of repeated volumetric examination of all possible ingredients of the urine, as indicating in the best manner obtainable the state of the arterial blood, from which the urine is derived: especially is this true of the exact volumetric acidity, representing the diminished alkalescence of the blood common in cancer.

The actual medicinal and dietary treatment of the various possible departures from normal can hardly be elaborated here, but they are along very much the same lines which you have often watched in connection with certain diseases of the skin; for you must remember that carcinoma is an epithelial disease, and that the laws of nutrition are much the same for this as for various other morbid conditions of the economy. I may say, however, that very many of my cancer patients have received the greatest benefit from acetate of potassa, often in the formula familiar to you (℞

Potass. Acetatis ℥i Tinct. Nucis Vomic ♏iv Extr. Cascar. fld. ♏ij-♏iv Extr. Rumicis radicis fld. ad ℥iv M. Sig. One teaspoonful half an hour before eating, well diluted). For many years I have administered potassa largely to these patients, and it is gratifying to find not only support but an incentive to its greater use, in the studies and experience of Ross, who pushes it to a very great extent, giving as high as 240 grains of potassium phosphate in a day. Ross also advises the free use of crude or brown sugar, as it contains a large proportion of potassium salts, which are for the most part removed from the white or refined article. I must also remind you of the great value of Bethesda water, in washing out the kidneys, given a tumblerful with each meal, and one tumblerful, hot, one hour before breakfast and also an hour before the evening meal.

The *blood* should also be watched, and in my hospital cases I have a count made

every week; for the hæmoglobin content, and the number of the erythrocytes, and the percentage of the varieties of leucocytes afford very valuable information as to the physical state of the patient, and the progress or recession of the cancer, and in a measure these data are of value in directing therapy. I have also the *weight* of the patient taken and recorded each week, as a guide to nutrition and dietary matters. Also the *saliva* is tested and recorded before and after each meal, and furnishes an indication in regard to the administration of alkalies.

Iron is found to be greatly wanting in the blood and tissues late in cancer, and should always be an element in the treatment of this disease. Skene Keith, noticing that after a cancerous mass was removed the blood recovered in regard to hæmoglobin and erythrocytes, administered iron with arsenic, with the greatest benefit, the growth shriveling up and the patient

gaining in weight; he recommends the citrate of iron and ammonia, the preparation which I have given to patients for many years past. He also advises hypodermic injections of iron, arsenic, and soda, and reports cases thus treated, some of them with good results. There is a loss of phosphates in these patients, and phosphate of iron or other phosphates are valuable.

When considering the metabolism of cancer mention was made of derangement in the action of the ductless glands in this disease, and of the use and value of certain preparations of the internal secretions in its treatment. While a hormone therapy of cancer is still in its infancy, in spite of many books and innumerable journal articles on the internal secretions, it is quite possible that the future may demonstrate its efficacy in helping to control the disease: for, that the latter are efficient agents in carrying on the vital processes in the

body, there can be no question, although as Biedl remarks, "Our knowledge of the chemistry of hormone formation is very slight."

But considerable clinical evidence has been accumulated that one at least of the internal secretions, namely, that of the *thyroid,* has a definite beneficial effect upon cancer; this I have administered to many cancer patients, and have reason to believe that it contributed to the favorable results obtained. Sajous, believing that insufficiency of the adrenal secretion is an element in altered nutrition, advocates thyroid extract on the ground that it stimulates the activity of the adrenals: Vincent quotes Erlich as believing that "there may be substances circulating in the organism which may stimulate the body cells to resist the athreptic influence of cancer cells." Shirlaw advises a tablet made of thyroid 6 grains, supra-renal ¾ grain, and pituitary $\frac{1}{16}$ grain. While the treatment by

these hormones from internal secretions is really in rather an experimental stage, it would seem more than probable that the correct use of these pluriglandular extracts, in combination with other proper dietary and medicinal treatment, would be of service in the prophylaxis and treatment of cancer. I have been a little cautious in the use of thyroid, beginning with two or three grains with meals, three times daily; for, as a promoter of catabolism it can disintegrate tissue faster than the emunctories can remove the effete products, and may thus poison the system.

Serum- and Vaccine-therapy are yet in a stage of development, and as I have had little or no personal experience with them I will not attempt to discuss their value, which time alone will demonstrate. While there have been many claims of success from treatment along these lines, unfortunately they have not been confirmed by later observations by others: I may say

frankly that they have never appealed to me as rational, in consideration of the views and experience I have long had along other lines of thought and practice. If, however, future investigations shall confirm some of the remarkable reports which have been made, the latest of which is by Nowell, there may be opened a non-surgical line of treatment of cancer which would mean much to many otherwise hopeless cases.

The *local medical treatment* of cancer is also an important matter which should receive careful attention. For many years in early cancer of the breast, under proper, general, dietetic, hygienic, and medicinal treatment, I have seen the lump vanish under the continued application of the iodide of lead, in Hebra's diachylon ointment of the German Pharmacopœia (ʒss-ʒi ad ℥i), and in very many instances I have had the assurance of patients that its application relieved the pain and was

of the greatest benefit also in axillary and other metastases. In other cases the continuous painting with ichthyol (50 p.c. in water) has seemed to be of great service, in combination with other proper treatment: all of this in earlier cases, before ulceration has occurred.

After ulceration has set in, either in primary or recurrent cases, proper local medication is very important. The ordinary micro-organisms, finding a suitable nidus, very readily germinate and add greatly to the suppuration, and consequent exhaustion and pain, and by their toxins, aid also in the general contamination of the blood and tissues. Hydrogen peroxide, laid on with pledgets of absorbent cotton is often of great service in changing the conditions of the part, and when followed by Russian oil, also applied with cotton, makes a most satisfactory dressing. Adrenalin 1–1000 is also often of service, both in checking active hemorrhage, and in relieving pain,

and shrinking up the granulations. Ichthyol, 10 to 25 per cent. in water, and permanganate of potash in water, 1 to 2 per cent., are also often of service, likewise acetate of aluminium, 3 to 5 per cent.: methylin blue and fuchsin in watery solution, 1 to 2 per cent. were formerly much used, and often served a good purpose. It is understood, however, that none of these measures have any great curative effect on cancer, but as contributory elements they should never be neglected. Ichthyol ointment (℞ Ichthyol ʒss-ʒi Zinc Oxid ʒss Unguent. Aquæ Rosæ ʒi) often proves most satisfactory, spread on thin layers of absorbent cotton, and changed several times daily, after soaking the part with one of the liquids above mentioned.

Time does not permit us to go into the matter of the X-ray, which undoubtedly has often been of great service in certain cases of cancer: it should be carefully but systematically employed, once or twice a

week in connection with other medical treatment; radium can also be of real service in these cases. In some inoperable cases a mild surgery, especially with the actual cautery, in the way of removing exuberant masses, which would have to slough off, can add much to the good progress of the case, and the occasional excision of cutaneous nodules removes just so much cancerous tissue, which by its secretion would poison the system.

In our study thus far we have seen that there is much to be done for cancer besides the surgical removal of the offending mass, the existence of which is an opprobrium to medical science, which has not thus far guarded mankind against it: and until time has passed, and by right living and proper medical attention cancer has ceased to be produced, or become greatly diminished, surgery will probably be a great factor in its treatment, as its mortality statistics are constantly improving. But there can be no

question but that with the adoption of proper dietary and medical treatment, even from the first suspicion of a malignant growth, and before, as also after operation, the final results of operative procedure will be even far better than have been yet attained.

LECTURE VI

CLINICAL CONSIDERATIONS AND CONCLUSIONS

The test of everything lies in the results obtained. Theories, discussions, and arguments are all unavailing unless results show their truth. In medicine, however, it is sometimes difficult to demonstrate results until after the lapse of time, as was well illustrated by the preposterous claims first put forth for "606," which is gradually attaining about its correct status. The same is true in regard to the surgery of carcinoma, where operations which formerly were attended with very bad results have gradually been improved, so that, while the late Dr. Agnew of Philadelphia once said, toward the close of his life, that he did not know if he had ever been justified in any operation he had performed on

this disease, the best surgeons are now claiming notable successes, with relatively good percentages of recovery: but here again, time comes in, and while the three-year limit of freedom from recurrence is valuable, it is still said that fully 90 per cent. of those who have once been affected with true cancer, die of the disease, and its general mortality is still increasing in spite of all surgery. Dr. John B. Murphy of Chicago, has also repeatedly expressed himself most pessimistically in regard to the ultimate results of the surgical treatment of carcinoma, especially in those patients who are fat, and with lax tissue, that is, exhibiting evidences of imperfect metabolism.

Dietetic and medical treatment of cancer, in the fullest sense, have never yet been given a fair and fully intelligent trial on a scale large enough to produce general conviction in regard to their value. Many cases have occurred here and there which

have recovered spontaneously, that is, without surgical interference, and often really to the surprise of the medical attendant: this of itself shows that under certain circumstances something may occur in the system which causes the malignant process to cease, and the cells to return to a normal function. This certainly should be a stimulus to discover what the reason is for this beneficial change, and we believe that it is to be found in what has preceded in these lectures.

When the New York Skin and Cancer Hospital was founded, over thirty years ago, Cancer was included with Diseases of the Skin, in the hope and expectation that in studying the internal causes of the latter light would be thrown on the etiology of carcinoma, which, as we know, is a disease of epithelial elements; and the earlier Report of the Hospital shows but one department, including Cancer with Skin Diseases, with operating surgeons and a gynæ-

cologist to assist, whenever their services were requested by the physicians in charge. Before long, however, for reasons which cannot now be given, and against the judgment of the present speaker, the plan was changed, and a separate cancer department was erected under the exclusive charge of surgeons. A Prize Fund was also early established, which has been slowly increasing, for the discovery of a cure for cancer by other than surgical removal.

For thirty or forty years I have held very much the same views regarding cancer which have been presented in these lectures, and have acted on them more or less strongly, and in later years very stringently, and have rarely seen cause for regret. For one reason or another I have also had many hundreds of patients, with various affections, on a vegetarian diet over varying periods: in a number of cases I have records extending over many years,

in which I have observed the patients from time to time (one psoriasis patient having continued it for over twenty years) and with only the best results, so I trust that you will accept and test the validity of my statements.

In looking over my case histories in private practice I find that I have more or less complete records of 96 cases of carcinoma, mostly of the breast (two of them having Paget's disease), 29 of sarcoma in various situations, and 619 of epithelioma of different degrees of severity, of which four others had Paget's disease; a total of 744 patients with these forms of neoplasm. Some of these patients were seen in consultation, others only once or for a brief period, but many of them were under care and observation for a greater or less length of time. During the past year I have also treated on the plan here indicated a number of cases of recurrent carcinoma in the New York Skin and Cancer Hospital,

which have been submitted to very careful laboratory study, some of whom have exhibited decidedly favorable results: some of these will be referred to later, but they are too recent to afford positive data, and I prefer to confine my consideration mainly to private patients, in regard to whom more reliable evidence can be obtained.

I will not weary you with any full analysis of these cases, nor will I consider any of them except those of carcinoma: for while I believe that sarcoma is of the same nature and origin, save that it relates to connective tissue cells, but few of the cases were submitted long enough to a vigorous treatment calculated to yield efficient results. I may say in regard to the cases of epithelioma, mainly of the skin, that some of the more severe ones showed very markedly the benefit of dietetic and medicinal measures of the character now being considered, and that it is my custom to treat such in the same manner; for reason

would seem to show that the same causes would produce abnormal proliferation of epithelial elements on the cutaneous surface as well as in other parts of the body.

In regard to the cases of carcinoma there were 6 in males and 90 in females; of these the right breast was affected 42 times, the left breast 45 times, and both breasts 3 times. In 28 cases the patients were operated on surgically before adequate treatment had been employed; many of these were earlier cases, or those seen in consultation. In seven instances it seemed wise to have an operation, after a more or less faithful trial of medical treatment. There were no cases of cancer of internal organs, except metastases, as these would not naturally come to me. The average age of the breast cases was 51.8 years.

In the large majority of cases, except those who had been surgically operated on, the diagnosis was clinical only, as it is an accepted fact that it is very unwise to make

a biopsy, even before surgical removal, and manifestly improper where this is not undertaken; but in most of the cases there was the independent diagnosis of one or more other medical men, and many of the patients came to me on account of threatened operations by prominent surgeons, and even after these had been arranged for; in 27 cases there had been previous surgical removal with recurrence, and in several cases more than one operation, with again recurrence.

The exact duration of cancer before coming under observation is always an uncertain item, for undoubtedly a tumor starts in an individual cell or group of cells, and has probably been forming some time before being noticed by the patient or attracting attention in any way. The average stated duration of the disease was 1.6 years before coming under observation.

Surgeons are fully agreed that the earlier a tumor is recognized and removed

the better the prospect of ultimate success, and this is eminently true in regard to remedial measures other than surgical: for as we have seen, after a cancerous process is well under way its cells secrete a something which hastens the general depravement of the system, and quickens the growth of the neoplasm, and naturally greatly increases the difficulty of overcoming the dyscrasia.

Thus in the effort to get at and remove all possible or prospective cancerous lesions, many innocent or non-malignant adenomata, etc., are operated on, which are afterwards found to be such microscopically. In the same way it is quite possible that some of the small breast tumors which have disappeared under the dietetic and medical measures here described were still non-malignant, and should not be grouped with carcinoma.

It is fair to say, therefore, that among my notes are also 22 cases of breast tumors

which have been excluded from the carcinoma list, and entered with other titles, such as abscess, cyst, chronic mastitis, adenoma, etc. But I claim that even if some of these also disappear under the measures we are considering, as they frequently have done, it is a better and more desirable result than if they had been removed by the knife: for in the former case the cause which induced the unnatural growth has been overcome, whereas by surgery only the obnoxious mass has been dislodged, and perhaps with it adjoining tissue and glands, but nothing has been accomplished toward checking the cause producing the offending lesion. But the very fact of the frequent recurrences after operation, in the neighboring skin or elsewhere, demonstrates the fact that surgery is but an attempt to rectify past errors, which might or might not have been prevented by careful medical foresight and action; we must, however, be thankful for the meas-

ure of success which has followed the noble efforts of our distinguished surgeons, only it is to be hoped that hereafter other measures will also be more commonly adopted, looking towards a prevention of the recurrence of carcinoma after operation.

Not to detain you too long with these clinical considerations, I would like to give the details of a few of the cases which have been most striking.

Mrs. B. E. C., aged 44, was first seen on account of trouble in the right breast, on September 19, 1892. She then had a flat tumor in the outer lower segment, an inch and a half in diameter, rather sharply defined, and tender on pressure at the sides, which she had noticed about two months. Not satisfied with the diagnosis of cancer, and hesitating at the thought of medical treatment, she consulted a well-known, prominent surgeon, who pronounced the tumor as undoubtedly cancer, and urged its instant removal; this I did not know until

she informed me of it some time later, after the tumor had entirely disappeared under treatment. I saw her at frequent intervals for six months, and the breast became entirely normal. Four years later she was again seen in regard to the menopause, which she was undergoing, and the breast was found still to be normal: she was maintaining her diet. Nearly three years later I learned from her husband that she was in perfect health, with absolutely no breast trouble, and for eight years later, while he himself was under occasional treatment, I learned repeatedly that she remained still perfectly well, over sixteen years after beginning treatment, with no recurrence of the breast tumor.

Miss B. M. L., aged 45, was first seen on January 4, 1894, with a tumor in the left breast, which had been diagnosed as cancer by three medical men, and one of them, a surgeon of prominence, had arranged for immediate surgical removal the next day.

The mass was situated in the upper and outer quadrant, well defined, not painful on moderate handling, but subsequently she experienced pain in it. Two months later the lump was recorded as less distinct and flatter, and within eleven months it had entirely disappeared. A month or two later she had some pain in the breast, in connection with the menstrual disturbance accompanying the menopause, but no trace of the tumor. On Nov. 8th, 1905, she called, bringing a relative for treatment, and the breast was found perfectly normal, and again five years later she called, with another trouble, the breast still remaining perfectly well, also sixteen years after first coming under treatment.

Miss J. M. A., aged 45, was first seen October 12th, 1905, with a tumor of the left breast, above, toward the median line, near the nipple, not painful on handling, though there was some pain afterwards, and it had been awaking her with pain at night

for some months, with also a numb, shooting pain in the daytime. She had seen a number of medical men always with the diagnosis of cancer, but she had declined operation. Two months later, Dec. 15th, 1905, it was recorded that there was very little to be felt in the breast, and there was no pain at any time, and on January 5th, 1906, both breasts were the same on palpation, with no sign of the former tumor. For one reason or another she has been seen from time to time, almost up to the present date, and remains perfectly free from her former trouble, a period of over nine years. She has been a most faithful patient, adhering strictly to diet and more or less medication, except when on certain occasions I have let up on the same; and all the time from the first she has been under great strain of work, mental and physical, as a city missionary.

Another very similar case was in the person of Miss G. M., aged 44, who has

been under constant observation and treatment off and on for various troubles from November 13, 1905, until yesterday. Fifteen years previous to her first visit she had fallen and struck the left breast which was bruised, but the effects wore off in some months, and there was no sensation in the breast for some years. Then 7 or 8 years later she began to have pain in the breast, aggravated before and during menstruation, which had continued until her visit, and for the last months she had been kept from her work in school, the pain being severe in the breast, and more recently in the axilla: in July there had been bleeding from the nipple. She had seen a number of medical men, with the diagnosis of cancer, and one surgeon of prominence in one of the large hospitals had strongly pressed for an immediate operation.

When first seen there was a tumor between two and three inches in diameter, in the upper, inner segment of the left breast,

hard, sharply defined, and more or less nodular on the surface: there were some enlarged glands in the left axilla. She had long been constipated and was passing about 60 per cent. of the amount of urinary solids proper for her weight. Under very active treatment it was recorded four weeks later that there had been hardly any sensations in the breast during the previous week, that the tumor had diminished materially in size, with only moderate hardness, and that she was now out doors every day, and feeling much better. One month later it was recorded that the breast was very well and on examination was almost the same as the other, there being some general caking in both: she had had no pain for some time. One month or so later she was again at her duties as a public school teacher, which she has continued at since, with rare exceptions, when some temporary ailment prevented: the lump in the breast did not wholly disappear for a

month or two later, but on April 7th it was recorded that the left breast was the same as the other, and no glands could be felt in the axilla.

From that time to the present she has had a variety of troubles, rheumatic and other, and it has been difficult to keep up a proper action of the bowels and kidneys; but in spite of strenuous and often exhausting work as a New York City public school teacher, she has had no return of the breast trouble, now for over nine years. A sister, aged 60, has just died with cancer of the stomach in a distant country town.

I could multiply these histories but do not want to tire you, though I do want to mention one more patient, to show what can be done in the case of recurrent carcinoma, after operation, of which I have had a number of cases with varying results, according to the duration and severity of the disease.

Miss H. M., aged 61, came to me June

21st, 1913, with the following history: About two years previously a lump appeared in the outer, lower segment of the left breast, which was removed in August, 1911; this healed soon, leaving a good axillary scar, and there was no thought of trouble until two months before her visit, when a small red spot appeared near the edge of the sternum. This enlarged and hardened and others appeared around the scar, until, when seen there were a dozen red nodules up to half an inch in diameter, near the center of the former site of the breast, with others, not red, above; with the tense skin and rapidly developing, multiple nodules here and there, further surgical operative procedure was out of the question.

Since that date she has been under strict vegetarian diet and medication, including thyroid from time to time, with repeated application of X-rays, and under all these measures together many of the nodules have disappeared; although some

new ones have formed, several of which have been removed under local anæsthesia, the wounds healing kindly. As she resides some distance from the city she has not been seen since October 7th, 1914, she wishing to take the X-rays nearer home, but she was earnestly charged to continue also the dietetic and other treatment. In this instance the patient has lived comfortably and without pain for almost sixteen months after coming under treatment, and, although she has lost some flesh, the active cancerous process, which would otherwise have carried her off long ago, has been in a measure checked. What will be the further history of the case one cannot tell, for it is quite possible that being away from my care she may neglect dietetic and medicinal treatment, trusting only to the X-rays, which, of course, cannot influence the real nature and course of the disease.

Reference was made to certain cases of

recurrent cancer in the Hospital which had been under active medical treatment during the past year, with careful laboratory studies, but it is naturally too early to report anything very definite in regard to them, especially as most of them were desperate cases, which had advanced far beyond any possible operative relief. Moreover several of them remained but a short time under treatment, as it is very difficult to convince this class of patients that any possible benefit can accrue from anything but an operation, and this being impossible they often give up and leave, preferring to die at home; moreover the dietary restraint seems also very irksome and useless to them and their friends. In one particular patient, however, there was such a remarkable improvement that it is worth reporting to you.

Mrs. C. M. was first seen February 12th, 1914. Nineteen years previously she had an abscess of the right breast, which

healed and left a tumor the size of a pigeon's egg in the inner, upper quadrant of the breast; this remained quiescent until it began to enlarge, eleven months before it was removed at the New York Skin and Cancer Hospital, November 14th, 1912. The tumor was then about the size of a hen's egg, with an area of skin the size of a quarter, attached to it: a second tumor was felt just below the nipple, which was not retracted, and the axillary glands were involved: there were no signs of metastases in the abdomen. A complete operation was then performed, with dissection of the glands in the axillary and supra-clavicular regions, and she was discharged January 16th, 1913.

On February 9th, 1914, she returned to the Hospital and was placed under medical treatment, with vegetarian diet. There was then an ulceration along the line of incision, from the second to the fourth rib, with many nodules around it, averaging a

third of an inch in diameter, raised and reddened. The liver extended two inches below the edge of the ribs, with a hard and nodular margin; the right arm was enormously swollen and helpless. When she left the Hospital, June 20th, 1914, the ulcer had entirely closed, many of the cutaneous nodules had entirely disappeared, the arm had returned to normal size, like the other, by measurement, and the liver had retracted to a trifle below the margin of the ribs, with hardly any nodules to be felt. The treatment had included twenty-five X-ray exposures, from 8 to 10 minutes each, about twice a week, over three areas each time.

While in the Hospital careful laboratory investigations were made, according to a definite schedule. The *blood,* studied weekly, maintained a hæmoglobin of 80+ for over two months, then fell a little, and again rose. The erythrocytes were 3,262,000 on entering, and rose within two

months to 4,282,000, then fell a little and rose again to almost 4,000,000: the leucocytes were 9,000 on entering, and fell to 5,200 just before leaving, the poly-nuclear 69 per cent. on admission, fell to 60 per cent., and again rose a little, and the proportion of the other forms remained about normal. The *urine,* volumetrically analyzed every three days, was kept a little below the normal acidity, and the specific gravity a little low, with a free daily amount of excretion, largely by Bethesda water: in spite of the vegetarian diet the urea excretion was not much below normal, and sometimes above, the chlorides were diminished, owing to the rather small amount of food taken, the phosphates varied a little above and below normal, there was never any indican, and the sulphates averaged a trifle below normal. The *saliva,* tested before and after each meal, was acid at first, but became neutral and alkaline off and on. The *weight,* taken weekly,

fell a little from the first, but maintained a good level, and rose a little before she left the Hospital.

This was a very difficult patient to manage, as she was a very ignorant Polish woman, who often rebelled at the diet, and wearied of the routine and restrictions imposed; she left the Hospital June 20th, 1914, against my wish, but with as great a change in her physical condition and disease as could be imagined, after about four months and a half treatment, carried out under disadvantageous circumstances.

One other case, seen recently, where the disease was recurrent after three operations, deserves mention, although it will be some time before any decisive result can be reported.

Mrs. W. C., aged 45, was first seen September 17th, 1914. Nearly four years previously she had noticed a lump in the left breast which was removed on January 6th, 1911, but it soon regrew, and a complete

operation was performed at the New York Skin and Cancer Hospital, May 30th, 1911. Two years later there was some return, and she was again operated on at the Hospital, May 30th, 1914. About two months before her first visit, September 17th, 1914, a swelling of the sternum was noticed, and soon another above it, both of which increased pretty rapidly to the time of her visit. When seen there was a hard mass in the scar over the sternum, about an inch and a half long, raised a quarter of an inch or so, reddened and immovable: an inch or so above it was another, smaller one, not reddened: they were not particularly painful on moderate handling, but painful when at hard housework. When last seen, December 7th, both lumps had subsided fully one-half, there was no pain at any time, and her general condition had improved immensely, she feeling better than she did four or five years ago, that is, before the beginning of the cancerous de-

velopment: she has been working all the time, unusually hard, as janitor of four buildings and also going out scrubbing and washing. She weighed 157¼ pounds when first seen, then ran down to 154, but is again gaining, being 155½ at her last visit. The outcome of this case it is, of course, impossible to conjecture, for one can seldom be sure that patients will be absolutely faithful to treatment, for a long enough time, but certainly the change in the woman and in the lesions in this two months and a half has been remarkable, compared with the increasing development of the disease in the two months previous.

I must mention one more case, which, although fatal, exhibited some of the good results of careful medical treatment even when a primary case had advanced far beyond the possible aid of surgery.

Mrs. M. B. J., aged 68, a private patient, was first seen on February 17th, 1914. Two years previously she noticed a lump

in the upper part of the right breast, after great and repeated mental distress from the death of a number of very near relatives, and a sister's mental derangement; the great nervous strain had been attended with various bilious attacks and nervous indigestion. The mass increased steadily in size and was kept concealed even from her family, until the day before she called, when her family physician who was consulted saw that it was far beyond the possible hope from any operation, in which view a surgeon concurred.

When seen the whole breast was involved, was double the size of the other, hard, immovable, and with an adherent crust over an ulcerating surface on its lower half, several inches in diameter, from beneath which was a moderate discharge: the axillary glands were enormously enlarged, as also the supra-clavicular, and she was strongly cachectic. She was placed on an absolute vegetarian

diet, with no coffee or tea, and appropriate medical treatment, and the breast kept painted with fifty per cent. ichthyol and water, care being taken not to disturb the adherent crust. In a very short time the discharge ceased, and the protective crust adhered until her death from exhaustion, with pulmonary œdema, on September 9th, 1914. On August 15th it was recorded that the breast had done very well, that it was soft and movable, and not larger than the other breast, with no discharge, and no pain since a short time after beginning treatment: the axillary glands had diminished three-quarters in size, and the supraclavicular glands were also very much smaller.

And now, gentlemen, my task is done. I have tried to let you see cancer through my spectacles, as I have seen it for very many years past, and to share with me my optimism in regard to the prophylaxis and cure of cancer, if only there can be sufficient enlightenment in the profession and

public: and I must tell you that in collating and preparing the material to support my long held views I have expended very much more time and labor in study, for some months past, than I could have believed possible. But as the subject developed, and as I discovered more and more support for my thesis, there was a fascination about the work which I could not resist; and if I have tried you with the many details of proof presented I beg that you will pardon me: for I wanted to present the subject so strongly that my hearers, at least, would accept the propositions I have developed, and believe what I have said in regard to my own experience with the terrible disease under consideration, and act upon both, and thus aid some sufferers with cancer.

From my recent article on "The Relation of Diet to Cancer" many medical journals have quoted me as ascribing the disease wholly to the use of meat, but you

who have heard these lectures now know that animal proteids are only one of the contributing causes.

I have tried to make it plain that metabolic errors, inducing a vitiated blood stream, are the basic cause of the aberrant action in the cellular elements of the body which may ultimately lead to malignant disease; and I have tried to show that there are many elements connected with modern so-called civilization which conspire to effect this end. I have quoted many who were well acquainted with cancer, who believed that luxurious living, which includes much animal food, coffee and tea, and alcohol, with indolence or want of sufficient muscular activity to burn up the waste products, and the persistent neglect of hygienic laws, should be placed first among the causes of cancer: but I have also mentioned that the refining and preparation and cooking of food prevented a proper supply of the mineral and other elements

of nutrition, and also that nervous influences could so disturb the action of the organs of the body that they could not perform their functions perfectly in the elaboration of nutritive material, etc.

But I cannot go over again all the matter already given in these lectures, and only mention these to remind you that there is no one single cause of cancer, and consequently that its prophylaxis and cure can never be found in any one single remedy; hence I can never believe in the sole use of thyroid, much less in the idea that sero-therapy can overcome a disease dependent upon the continued operation of so many causes; and still less can I believe that the mere cutting out of an already diseased portion of the body is the proper and only means of overcoming such a malady as cancer.

I have acknowledged that local irritation of many kinds may be the proximate cause for the development of a malignant tumor

in any particular locality, as Ewing has so clearly shown in his excellent resumé on pre-cancerous lesions; but I have also contended that we should withal look into and overcome the cause; why, when once started by local injury the cells should pursue such a progressive, aggressive, and invasive course; and this is found, I believe, in the disturbed character of the fluids which provide them with nourishment for their abnormal growth.

From this study of cancer in regard to its nature, frequency, geographical distribution, metabolism, dietetic relations, medical treatment, and clinical considerations, what conclusions can be drawn? Have we solved the problem of cancer? Far be it from us to make any such claim. Scientific research and study must still go on in the laboratory, but clinical research and study, with laboratory work, on the human subject, which have not been hitherto sufficiently cultivated, should be

pushed, so that by a mass of carefully recorded observations the truth or falsity of what has been here quoted and said may be refuted or confirmed.

From the enormous work which has been done on cancer with the microscope and the test tube, it would seem sometimes that research workers have become somewhat myopic, and not farsighted enough to recognize the true value of statistical studies and clinical observations. In these lectures we have attempted to make a brief synthetic study of some of the work which has been done in connection with cancer, and from this we believe that certain conclusions can be drawn; if these are correct and followed, it is hoped that much more can be accomplished in regard to the prophylaxis and cure of this more than threatening, fatal malady. In order that you may hold clearly the points which have been made I want to give you a synopsis or conclusions of them, as they have been

brought out in this and preceding lectures.

1. Cancer is but a deviation from the normal life and action of certain of the ordinary cells of the body, which, for some as yet unexplained reason, take on an abnormal or morbid action; with this there is a continued tendency to a malignancy which invades contiguous tissue, and in the end tends to destroy life.

2. There is some reason to believe that this action first takes place in what are known as "embryonic rests," or pre-natal, wrongly placed tissue elements, which, however, are now shown to exist in every one, in many localities: but the reason why they take on this malignant action, and form cancer, has not been satisfactorily explained.

3. Cancer is *not* wholly due to traumatic causes, although those play a not inconsiderable part in its occurrence in certain localities and cases.

4. It is pretty conclusively decided that

cancer is *not* caused by a micro-organism, or parasite.

5. It is also known clinically and experimentally that it is *not* contagious.

6. *Nor* is it hereditary in any appreciable degree.

7. Occupation has *not* any very great influence on the occurrence of cancer, although it is more frequent in some pursuits than in others.

8. Cancer is *not* altogether a disease of older age, although its incidence is greatly increased with advancing years.

9. It does *not* especially belong to or affect any particular sex, race, or class of persons.

10. It is *not* confined to any location or section of the earth, but has been observed in all countries and climates.

11. No single cause of cancer has yet been demonstrated, nor is it likely that this will ever be the case, as the experimental and other investigations have cov-

ered almost every possible line of research, with only *negative* results.

12. The exclusion of almost every other possible cause of cancer, as well as its pathological history, leads to deranged metabolism as the only remaining possible etiological element; this acts by inducing changes in nutrition, which latter depends on diet and the proper action of the secretory and excretory organs, which, still further, may be affected by nervous influences.

13. While the bio-chemistry of cancer throws little light on its true nature, enough is known to show that the morbid changes in the cells are largely associated with deranged metabolism.

14. The blood, in advancing cancer, manifests changes which indicate vital alteration in the action of the organs which form blood and control the nutrition of the body and its cells.

15. Clinical and experimental evidence

demonstrate that the secretions and excretions of the body exhibit departures from normal, which, while not pathognomonic of cancer, indicate metabolic disturbances involving the nutrition of the cellular elements, which disturbances are of importance.

16. The evidence seems certain that the cancer mass itself, when fully developed, secretes a poison which tends to augment its own growth and hastens the lethal progress of the disease.

17. Cancer mortality is undoubtedly on the increase in every portion on the globe.

18. This increase seems to vary inversely with the decline of tuberculosis, in many localities.

19. The incidence of cancer seems to follow closely along the lines of modern civilization.

20. This extension of cancer seems to depend largely upon the altered conditions of life, particularly along the lines of self-

indulgence in eating and drinking, and indolence.

21. The augmentation in the consumption of meat, coffee and alcoholic beverages appears to be coincident with a very great, and proportionately greater, augmentation of the mortality from cancer.

22. The nerve strain of modern life seems to be an element of importance, both through disturbance of metabolism, and by direct action on morbidly deranged cells.

23. No single remedy for cancer will probably ever be discovered, since it is conceded that there is no single cause for the disease.

24. Surgery has improved materially the statistics relating to the mortality of operative cases; but the total achievements along this line are insignificant compared with the general ultimate mortality of over 90 per cent. of those once afflicted with cancer.

25. Surgery has had, and may long have its function to perform in removing the products of the disease, more or less efficiently, curing some and prolonging the life of others, but it can never hope to lessen greatly the morbidity of cancer.

26. The X-ray and radium, as also caustics, are in the same position as surgery, and can do relatively little more than cause to disappear lesions which have developed from causes which they cannot reach.

27. With all these means the measure of success, aside from the technical skill of the operator, largely depends on the time or period of development of the malignant tumor before treatment; the earlier the removal is undertaken, other things being equal, the greater the possibilities of success.

28. The same is true in regard to the treatment of the disease by means other than those mentioned: the earlier the morbid process leading to tumor formation is

attacked by dietetic, hygienic, and medicinal measures, the greater the promise and expectation of success, present and permanent.

29. The prevention of cancer, therefore, or the checking of its increasing occurrence, depends largely upon the early enough adoption of such measures as will limit the agencies which induce a derangement of the body juices which tend to bad nutrition and derangement of the body cells.

30. The simple life, with the avoidance of the dietetic and other causes which have been found to induce cancer in nations and individuals, promises the best hope for the arrest of the rapidly increasing development of cancer throughout the world.

31. It is more than possible, however, that the long continued operation of many baneful causes has produced such a degeneration of tissue in the human race, that it will take a generation or more of proper

living to make the beneficial impression on the general incidence of cancer which is so longed for.

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